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UNIVERSITY OF ALBERTA

Rural-Rural Migration in Serengeti District, Tanzania

by

Feroz Jafferli Kurji



A thesis
submitted to the Faculty of Graduate Studies and Research
in partial fulfillment of the requirements for the degree
of Doctor of Philosophy

Department of Geography

Edmonton, Alberta
Spring 1995



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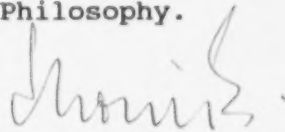
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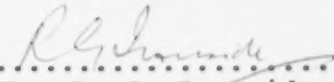
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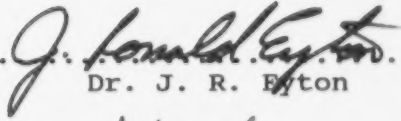
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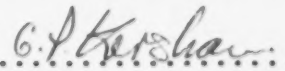
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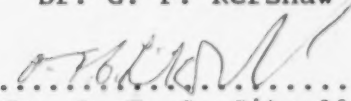
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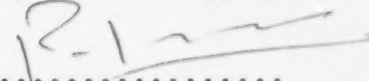

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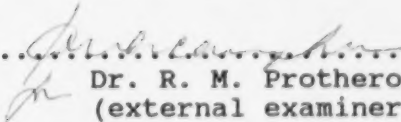

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Dedication

To

My late parents, Jafferali and Sakarkhanu
For their love and enormous sacrifices towards my education

To

The people of Serengeti
In admiration of their wisdom and generosity,
and in the hope that they will not be dispossessed
of the riches that they have shared as a World Heritage

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The Serengeti remains an awe inspiring place to most of those who have visited it and I have had the good fortune of having spent much of my life around and in the area's beautiful and vast landscapes, among the spectacle of its wildlife and the drama of the "migration" of almost two million large mammals, the archaeological treasures, and fascinating ecological processes. The presented study on the migration of people was thus an outcome of, both, a concern about the future of the Serengeti and a growing curiosity about the people who live in the area and who have generously allowed a lot of their ancestral lands to be set aside for the conservation of wildlife and as a World Heritage Site. Their deeper values about nature and life remain little understood, although knowledge about Serengeti's people and improvements in their life are crucial to the survival of the area's unique ecological, scientific, cultural, aesthetic and economic values.

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ABSTRACT

The relationship between mobility, migration and development is a topic of theoretical interest and practical significance. Much of the research in it has focused on the processes and impacts of urbanization although rural-to-rural population movements in many developing countries involve many more people and have widespread effects. This study of rural-rural migration in the Serengeti district (Tanzania) examines the patterns, causes, processes and impacts of migration at the macro, meso, and micro levels. It views migration as a process rather than as an event.

The movement of people forms an important link connecting communities and places. The macro-level analysis uses census and historical information to describe the changes in the patterns of population movements, settlement and land use during the past century. Local population trends in the Serengeti district have been connected, through spatial and temporal lags, to population changes and processes of redistribution in the Eastern Lake Victoria region of northern Tanzania. Between the early 1890's and 1930's, the district experienced depopulation, mainly because of the effects of rinderpest and sleeping sickness, as mediated through the linkages between people, livestock, wildlife and the vegetation. Populations recovered and expanded until constrained by the boundaries of the Serengeti National Park. Since the 1980's, there has been a reversal of the earlier trend of net in-migration into the Serengeti district. Socio-political strife, droughts and environmental degradation have compelled people to migrate out of many parts of the district, especially to areas of ancestral origins in nearby districts.

A field survey of a sample of one hundred seventy three households in eighteen villages indicated that the peoples of the Serengeti district are mobile rather than sedentary and most have migrated at least once in their lives, usually as entire families and households. The movements are for several reasons, usually for obtaining access to resources like land, and for social purposes such as to reunify the family, and due to illness and death in the household. Migrations are undertaken to satisfy the needs of survival rather than socio-economic mobility; movements are not carried out by people

because of a sense of relative deprivation when compared to the other members of the community of origin.

Most migrations involve short distances and in some areas are carried out within migration-fields based on kin relationships and associated territories. Migrants usually obtained information about potential destinations from their own previous visit or visits there. Once the decision to move had been made, migrants usually moved together as a household, and moved quickly, and directly to their destination. Differences in gender, education, and the reasons for migrating had no influence on the distances moved. Many migrants relied upon their kin, friends and members of the village for help in re-establishing their homes and household agroecological systems. Some of these networks of assistance are based on traditional culture, for example msaragambo.

Local village governments have been empowered to allocate land to their residents and this role has indirectly enabled them to regulate the rate of in-migration into their villages, especially where land is not easily available. Village local governments can also screen potential in-migrants before granting them permission to move into and reside in the village. These roles have affected some of the processes of migration, for example in the choice of destination and acquisition of needed resources. National population policies need to take these local policy effects into consideration in rural development planning.

The migration of agriculturalists involves a change in their 'agroecological locus', in addition to the changes in 'spatial and social' loci proposed by Zelinsky. How migration affects agricultural development is little understood. The changes in the 'agroecological locus' of migrants in the Serengeti district were operationally determined by assessing the changes in, for example the agroecological characteristics of the area, the amounts of land and its ecological features, the distances to fields, the differences in the cropping patterns, use of cultivation techniques and extra-household labour. The household agroecological systems of the migrants, before and after moving, and their host communities have been modelled and indicated significant differences that need to be taken into account in agricultural development planning in the district.

Generally, there is a pattern of change rather than continuity in the household agroecological systems of migrants in their destination villages as compared to villages

of origin. The size of the household, the diversity of land types available for cultivation on the catena, the distance to fields, the length of residence and the access to extra-household labour are among the factors that affect the acreage cultivated by households.

The issue of social justice and equity are among the cornerstones of Tanzania's development goals and strategies. The study concludes that migration contributes to processes of rural social differentiation in Serengeti district, especially mediated through the variations in the ownership and use of land for cultivation between migrants and their host, village communities. Migrant households tend to be disproportionately represented among the lowest quartile of households in per capita land ownership and use in villages. Measures of equity are sensitive to variations in household size, since household size and the total acreage of land owned and cultivated are strongly, and positively inter-related. The socio-political strife in the district since 1985 has disrupted earlier processes of land allocation by village governments which otherwise have, remarkably, not discriminated against households and persons because of their gender, level of education, ethnicity, power status in the village, use of farm technology, etc. There is need to apprise and educate village local governments about the insidious and detrimental social, political and developmental effects of the slightly inferior access of in-migrant households to land, and to redress it. Resolving the problems of access to land, in a just manner, and improving rural life are crucial also to the success of the effort to conserve the wildlife resources and protect the unique archaeological sites of the Serengeti.

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Chapter One

Introduction

The study of mobility and migration in the Serengeti involves issues that have antecedents in hominid evolution, is of concern to the socioeconomic development of its contemporary inhabitants, and is of importance in the task of protecting its unique biophysical resources for the future as a global heritage. A trail of footprints made in volcanic ash by three bipedal hominids about three and a half million years ago represents the earliest known evidence of human-related movement (Leakey et al. 1979). Understanding the significance of movement in human development is part of the theoretical task of migration analysis and closely linked to the challenges of achieving rural development and ecological conservation in the Serengeti district and eastern Lake Victoria region of northern Tanzania.

Tanzania is the largest country in East Africa and its population has been growing rapidly, from a total of about 12.3 million in 1967 to about 23.2 million in 1988 (Bureau of Statistics 1989). During 1967-1988, the population growth rate averaged about 3.1% per year. Tanzania's development goals and strategies emphasize rural development (Arusha Declaration 1967), and ecological conservation of wildlife and their habitats (Arusha Manifesto 1961). The goal of rural development is to promote the well-being of the rural inhabitants, especially in the quality of their life by providing better access to social infrastructure like educational, health and transportation services, safe and reliable water supplies, better nutrition and protection from preventable diseases, social and physical security, and enable people to have complete political participation. These goals are associated with the basic human needs strategy of development.

The goal of ecological conservation in the Serengeti region is to protect the rural environment from degradation and maintain its capacity to provide biophysical resources on a sustainable basis for a growing rural population. In addition, this goal includes the objective of protecting the wildlife and habitats of the Serengeti that are nationally and

internationally renowned for the diversity of plains game and their seasonal 'migrations', and the aesthetic, scientific, cultural, and economic values (Sinclair and Norton-Griffiths, 1979).

Malcolm (1953:109) has defined the context of rural development and ecological conservation by observing that "the provision of habitable area and improved means of production is a race against population increase". An increase in human numbers involves several responses (Lipton 1990), for example agricultural intensification and technological improvements in response to increasing density (Boserup 1965), migration to uninhabited areas and development of 'frontier regions' (Kosiński and Prothero 1975, delayed marriage, adoption of 'prudential checks' (Malthus 1830), modern fertility control (Davis 1963), and transformation of the resource base and economy through urbanization and industrialization (Grigg 1980). Each of these options may be used alone but usually a combination of responses are adopted (Davis 1963). Alternatively, there would be undesirable Malthusian 'positive checks', that is, rising age-specific death rates (Lipton 1990:218).

This introductory chapter first defines the context and problematique of the study of rural migration and agroecological change in Serengeti district. The second section of the chapter presents the aims and objectives of the study. The third section notes the major hypotheses and sub-hypotheses and the final, fourth section outlines the organization of the dissertation.

1.1 Migration, Agriculture and Development: The Problem

Population movements have been a major response to African demographic changes throughout the continent's history and have been integral to the expansion of settlements and the development of agriculture (Udo 1964, Prothero 1972, Okoth-Ogendo 1989). The 'man-environment' paradigm was a central focus, albeit at a societal-level, in the earlier studies of African mobility and migration. The relationship between people and land, as mediated through agriculture, was a major factor in rural population movements except in areas of mining which attracted labour (Hall 1945, Malcolm 1953, Prothero 1957, 1964, 1972, Hunter 1963, Udo 1964, Moss and Swindell 1975). Subsequent analyses of

mobility shifted to emphasize its macro-context and structural linkages, especially population growth, urbanization and modernization (Mabogunje 1968, 1970).

An 'urban bias' (Lipton 1977) emerged in African development thinking because of accelerating urbanization and the dominant role of urban centres in the spatial and structural processes of modernization. This bias was reinforced by the greater availability of data on urban areas where censuses, surveys and studies were easier to conduct. Rural areas and intra-rural mobility were relatively neglected in the ruling development paradigm focused on greater economic growth and industrialization, as initiated through urban growth poles, capital and technical inputs, and export capacities for cash crops.

In the 1970's, development experts and governments began to recognize that improved indigenous agriculture, integrated development and a better quality of rural livelihood were essential (Stewart et al. 1992, Eicher 1992, Sai 1986) in dealing with the problems of rural retention of population, rapid urbanization and regional inequalities as causes and consequences of population movements. According to Stewart et al. (1992:8), "Probably the single most important policy mistake in the 1960s and 1970s was the neglect of agriculture, especially food agriculture, which received inadequate investment, R & D, infrastructure and prices in most countries.....The strategy adopted in the 1960s and 1970s was a dead-end from which the current impasse emerged" (p42). This impasse represents the failure in achieving agricultural and socioeconomic development despite great efforts and resources having been invested in previous decades. Generally, the causes of agricultural backwardness have emphasised (i) purely technical-economic factors such as poor and static farm technology, and lack of opportunity for economic gain, (ii) non-economic factors like the characteristics of the agrarian structure and the prevalence of traditional attitudes and values in the socio-cultural situation (Joshi 1986), and (iii) the linkages between agriculture and other sectors of the economy which are 'biased' against the rural farmer and in favour of the urbanized elites (Lipton 1977).

The neglect of agriculture was followed by poor agricultural performance from the latter half of the 1970s into the mid-1980s. For example, during 1975-80 food production per capita in Tanzania was increasing at an average annual rate of only 0.5%. The rate dropped and the trend reversed to a rate of -1.8% per annum between 1980-85. There

were far reaching adverse consequences of the neglect of agriculture: food availability and nutrition levels fell, imports of cereals increased but were inadequate, and balance of payments deteriorated as the production of export crops declined and were compounded by adverse terms of trade. The shortage of foreign exchange constrained imports of inputs, goods and services necessary for agricultural growth (Stewart et al. 1992).

In rural areas, the failure in agriculture was associated with worsening poverty and increasing economic differentiation, rising inequality in land ownership, and the emergence of a large and growing landless proletariat in some countries (Stewart et al. 1992:11). Hill (1990) has attributed high famine-induced mortality in many parts of sub-Saharan Africa primarily to wars, epidemics, and deprivations arising from problems of production as rooted in the structure and organization of agriculture and its social-cultural context. Natural calamities, for example droughts, and population growth have, in his view, been less significant as causes of great mortality and large displacements of populations in many parts of the continent.

The impacts of population growth and movements, forced or voluntary, on people, their areas of origin and destination, are also mediated through the dynamics of the household demography and agroecological system. McNicoll (1990:148) has suggested that the economic-ecological outcomes of demographic trends are determined by the interaction of two sets of factors: (i) 'the nature and intensity of human activities impinging on the ecosystem', and (ii) 'the resilience of the ecosystem under human impact'. Demographic-agroecological responses also vary, as influenced by the social and cultural context: for example, in West Africa, the Bambara respond to dry seasons and drought by combining into large households and herding units to minimize risks for individuals; in contrast, the Fulani subdivide into small family units, separate their cattle by age and sex, goats and sheep for independent herding, and disperse to better exploit scarce grazing (Hill 1990).

A number of policy prescriptions have been advanced to deal with the problems of economic development and agricultural performance in Africa. One set of policies are those arising from the structural adjustment programs with an emphasis on export-led

recovery. Hart (1982:154) examined West African agriculture and concluded that the establishment of publically or privately owned "large, capital-intensive estates" offered the only effective approach to achieving "a long-run dynamic of economic development through labor specialization, capital investment, and productive innovation".

However, the structural adjustment measures of the 1980's have improved rural terms of trade mainly for export crops but have often worsened the situation for subsistence crop farmers as subsidies for farm inputs have been removed, for example in Ghana (Stewart et al. 1992). In many cases, the absolute position of food producers has also deteriorated greatly, for example in Cote d'Ivoire. The weak agricultural performance has also worsened the level of rural non-agricultural activities which are an important source of income and employment for the rural poor. According to Dandekar and Rath (1971), the creation of income opportunities outside agriculture is of greatest importance in solving problems of rural poverty.

An alternative set of prescriptions emphasizes a 'growth with redistribution' perspective in agriculture. Ishikawa (1971) has urged the creation of an agrarian system that combines both profitability and collective welfare to motivate agricultural progress, and in which both modern and traditional inputs are put to effective use in a scientific manner. Stewart et al. (1992:14) have observed "First, and most important, is the necessity to achieve a dynamic egalitarian agriculture - which is itself an essential element in a development strategy. Secondly, it is necessary to improve supply conditions - by developing rural infrastructure - of roads, communication, energy and technology dissemination - improving rural education, with special emphasis on technical areas, and creating and improving credit institutions directed towards small-scale borrowers". In their view, highly unequal agriculture creates the lowest rural linkages since large and wealthier farmers use imported inputs and consumer goods made outside rural areas.

Further, an agrarian-focused strategy in Sub-Saharan Africa should not mean 'agricultural promotion at any cost and of any type'..... It is essential that it be reasonably egalitarian so as to ensure full participation and to maximise rural linkages. It is also essential that it not be excessively focused on traditional export crops; food crops, especially crops produced and/or consumed by poor people, should be given

special attention. Non-traditional, high-value, exportable crops should be encouraged if their benefits are equitably distributed. The strategy should be smallholder based. Plantation-type agriculture leads to severe rural inequality, creating a landless rural proletariat. Moreover, it also has weak linkage effects with rural non-agriculture Smallholder agriculture, therefore, offers most potential for an efficient and equitable strategy if given appropriate institutional and technological support" (Stewart et al. 1992:12-14).

Collier et al. (1986) note that an understanding of the degree, type and causes of inequalities has implications for formulating appropriate rural development policies. Rural inequality is important in Tanzanian development thinking and planning because of "its connection with poverty" (Collier et al. 1986:8). The majority of Tanzania's poorest are in the rural areas. It is sociologically of concern because the foundations of rural social relations are based on reciprocity and mutual help. Finally, it has been suggested that the upper peasantry dominates the power structures within the organization of villages (von Freyhold 1979, Coulson 1982). Hayami and Kikuchi (1981:225) have suggested the need for policies that "make a positive use of indigenous community institutions and organisational principles as a basis for modern rural development institutions" to achieve self-sustaining rural economic growth.

In Tanzania, government policy interventions in rural development since the Arusha Declaration (1967) have been almost unparalleled elsewhere on the continent. 'Villagization', communalization (ujaama), provision of social infrastructure, and stimulation of agricultural production were policy interventions aimed at transforming rural agriculture, quality of life, and promoting economic growth and social development nationally. One major aim is to attain egalitarian development as a foundation of social justice and political strength. Rural society, environment, economy and demography are not static and a major challenge is how to achieve development objectives and goals in their dynamic settings.

The role of migration and its impact on agricultural development is little understood (Mollett 1991, White and Woods 1980). In turn, the role of agriculture and its social relations of production with migration also remains little researched (Balan 1983, Nurun

Nabi and Krishnan 1993). Yet, more agriculturalists were involved in rural-to-rural migration in the late 1980's world-wide than in rural-urban movements (Dasgupta 1985, Mollett 1991). Goldscheider (1971, 1984) has noted that migration is one of the processes that contributes towards social differentiation. Thus, the analyses of population change and agriculture development at the village, and the individual and household levels need to be considered in the context of the national goals of rural development and ecological conservation in the Serengeti district.

1.2 Aims and Objectives of the Study

The study has a number of complementary aims: (i) to investigate the patterns of population redistribution and rural-to-rural migration, (ii) identify the causes of population movement, the processes of resettlement and resource acquisition in the place of destination, (iii) assess the type and extent of changes in the agricultural activity and cropping practices of migrant households between their places of origin and destination, (iv) and consider the implications of agroecological changes associated with migration for rural development and ecological conservation in the Serengeti district. The analysis of processes of population redistribution, migration and agroecological change is to be at the macro, meso, and micro levels.

More specifically, the macro-scale analysis aims to examine changes in population distribution and net migration at the regional, district, division, and ward levels. This analysis adopts an historical perspective, and attempts to situate the role of migration in the dynamics of social change and development in the past century, as can be understood from the available written accounts and population data. The meso-level analysis examines the changes in the population sizes of villages in the Serengeti district, and estimates their net migration for the 1978-1988 period. Ward and village-level data from national censuses have become available only since the 1978 Tanzania census (Bureau of Statistics 1978).

In addition, the changes in the population of Serengeti district and its sub-units are assessed in the context of the trends in population size and redistribution in a larger, regional setting of the Eastern Lake Victoria region. The regional spatial perspective is

adopted for two main reasons. First, the Serengeti district has been historically affected by significant in-migration from the rest of the region, and out-migration from the district to the rest of the region. The demographic region includes the inhabitants of several districts to the east and south east of the shores of Lake Victoria. Second, population movements into the Serengeti district are the consequence of epidemiological and agroecological processes that affected the peoples of the eastern lake region since the early 1890's.

The study also aims to identify the determinants of migration in the wards of the eastern lake region and villages of Serengeti district. It is useful to understand the factors associated with the trends in net migration at various spatial levels for making and implementing policy on rural development and ecological conservation. The village is adopted as the unit of analysis of the determinants of migration for several reasons. First, it forms the community settings of the individual and the household, and within which access to resources is obtained, social relations and life are carried on. Second, the village forms the unit of political and administrative organization that most immediately affects members of the community and with which people have the closest contact; for example the village council is empowered to allocate land to people, and the village can be registered as a cooperative unit and as a legal entity under the 1975 'Villages and Ujamaa Act'. Other administrative structures, for example the district authorities, are often far removed. Third, the village is the basic development unit in Tanzania's development outlook; it forms the unit for the provision of social services like schools, health clinics, water supply (Collier et al. 1986). Finally, the village can be used as a unit for resource assessment, land use planning and organizing programmes to promote agricultural extension, health and nutrition education, and ecological conservation. However, villages are not isolated demographic entities and their broader spatial settings also need to be considered.

The analysis at the micro-level focuses on the household as the unit of study. It aims to identify the social, demographic, and economic characteristics of migrants and non-migrants, the reasons for the movement of individuals and households, the ways in which migrants carry out their relocation and obtain access to land and other resources

in their destination. The types and degree of changes in access to land, its ecological characteristics and location, have consequences for the household labour resources and are linked to the type and extent of changes migrant households make in their cropping patterns and practices between their places of origin and destination.

The household is particularly important because it is the unit of production, consumption, security, and reproduction (Harbison 1981, Findley 1987). The household is also the unit that, through the labour and expertise of its members, makes decisions about the crops it will cultivate and the practices that will be used, and how the produce of agricultural activity will be used. Finally, decisions to move or not to do so are made by individuals or the household as a part of the overall household, rather than only the individual's, strategy to obtain a livelihood and achieve well-being.

The rates of net migration at the village level are not independent of the incidence of individual and household migration (Connell et al. 1976). The study aims to examine how the structural and contextual settings of the village and its community, for example the economy and ecology, the role of village governments in land allocation and their policies towards population and resources, the social networks involving reciprocal assistance, etc., impinge upon the the processes of individual and household migration. The global and contextual variables are envisaged to have effects, in addition to individual and household features, on migration behaviour and its consequences (Findley 1987).

The movement of people has impacts upon the village community, its activities and organization, and on the availability and use of resources. Since access to basic needs, equity and agricultural transformation are cornerstones of Tanzania's rural development goals (Arusha Declaration 1967, Collier et al. 1986), the role of migration in the processes of social differentiation (Goldscheider 1971) requires particular consideration. These issues are of importance for public policy making, development planning and ecological conservation.

The study has the following three main objectives at the macro-level of analysis. The first objective is to map and describe the pattern of changes in the size and distribution of population in the Serengeti district and its broader spatial setting of eastern

Lake Victoria region. The second objective is to estimate the rates of net migration for the villages of the Serengeti district using data from the 1978 and 1988 Tanzania censuses. The third objective is to identify the social, economic, demographic, and environmental factors that are associated, as determinants, with the various rates or levels of net migration in the Serengeti district villages. This attempts to identify what sorts of villages, on the balance, are likely to send out or draw in migrants, and attempt to explain the observed patterns of rural-to-rural migration in terms of the socio-economic systems from which the migrants have come and go to. The net migration outcome of a village results from the balance in the rates of both in-migration and out-migration types of flows.

The macro and meso scale analysis also provides a framework to draw a sample of villages and households for a detailed study of the processes of migration. At the meso and micro levels, the study has the following main objectives. The first objective is to identify the reasons for the move, the sources of information about potential migration destinations, and the manner in which the process of relocation is achieved. The second objective seeks to understand how in-migrants to a village gain access to rural resources, particularly land, and how the processes of re-establishing the home and household agroecological system are accomplished. The third objective is to determine how migrants and their households differ demographically, socially, and economically from their host communities in the migration destinations. The fourth objective is to assess the differences, if any, in the access to land, agricultural activities and cropping practices of in-migrants and non-migrants, and of migrants in the places of origin and destination. The fifth objective is to examine the role of migration in the processes of agroecological and social differentiation in Serengeti district's rural communities. The final objective is to discuss the theoretical, methodological, public policy and research implications of migration and other associated processes of rural dynamics.

The above objectives will be accomplished by analysing data from three main sources. The macro-level analysis of population size and redistribution at the regional, district and divisional level will be based on data from national censuses in 1957, 1967, 1978 and 1988. The meso-level study will derive estimates of net migration in wards and

Serengeti district villages with data from national censuses in 1978 and 1988. In addition, a special village-level, questionnaire survey in a sample of villages in the district will provide the data for the community-level variables affecting individual and household migration behaviour and their impacts. The micro-level analysis will be mainly based on data from a household-level, questionnaire survey of a sample of households in the sample villages. The household-level survey will include households that moved into the sample villages after 1985 ('migrants'), and households that had not moved since 1985 ('non-migrants').

1.3 Major Hypotheses and Sub-Hypotheses of the Study

The central hypothesis of this study contends that there are changes in the 'agroecological' locus associated with the migration of rural agriculturalists in Serengeti district, in addition to the changes in 'spatial locus' and 'social locus' noted by Zelinsky (1971). The changes in the agroecological locus are mainly mediated through changes in the 'spatial locus' and 'social locus'. The primary question addressed is: what happens when an agriculturalist household undertakes to move, and moves to a new village of residence?

More specifically, the study focuses on the following major questions: first, what is the extent of mobility among the people, the source and destination areas of migrants in the Serengeti district?; second, why do people move, how do they acquire information about potential destinations, how far do they move and how do they accomplish their relocations?; third, how do migrants acquire land and other resources, establish their homes and operate their agroecological systems in the destination villages?; fourth, how do the amount and features of land (number of plots, distances to plots, catenary location of plots, average fertility of plots) in their places of destination compare to that in their places of origin?; fifth, how do migrants compare in their access to labour (household, relatives, msaragambo, hired labour) and use of techniques to cultivate in their places of destination with their access in the locations of their origin?; sixth, do migrants replicate the same cropping patterns (number, types) in their places of destination as compared to the areas of their origin?; seventh, how does the 'agroecological' system (land, labour,

technology) of the migrant households compare to that of the non-migrant households?; eighth, how does migration affect rural equity in access to land?; ninth, how equitable is land allocation by village local governments in the context of variations in demographic, socio-economic features, and migration status of households, access to labour and technology, and differences in village-level land, population and net migration situations?; and, tenth, how successful is migration as a strategy to improve life situations as assessed objectively, and as perceived by migrant households?.

The study does not intend to evaluate the rationale and the processes of household decisions about their practices and use of agricultural resources. Instead, the focus is to identify the patterns of change, continuity, adjustment and adaptation entailed in the household agroecological system associated with and as a consequence of migration. Such analysis is important in understanding the role of migration in agricultural development, rural structural differentiation, innovation, social change, and their spatial variation.

The collection of data and their analyses are aimed at testing the following specific research, and null hypotheses and sub-hypotheses:

Hypothesis 1: Population redistribution in the Serengeti district and its regional settings have been significantly influenced by net migration.

Hypothesis 2: There are no significant differences in the number of migrants over distances moved.

Hypothesis 3: There are no significant differences in the average distances moved by primary, repeat and return migrants.

Hypothesis 4: There are no significant differences in the mean distances moved by migrants according to variations in their gender and education level.

Hypothesis 5: There is no significant association between variations in population density of administrative divisions and their subsequent inter-censal rates of population growth for the periods 1957-67, 1967-78, and 1978-88.

Hypothesis 6: There is no significant association between variations in population density, dependency ratio, the proportion of area cultivated, and the agroecological conditions in administrative wards and their subsequent inter-censal population growth and net migration rates for the 1978-88 period.

Hypothesis 7: There is no significant association between mean annual population growth and net migration rates in Serengeti villages during 1978-88 and differences in their 1978 population size, ecological and locational characteristics, and accessibility to other villages:

Sub-hypothesis i): There is no significant effect of village population size on its subsequent growth and net migration rates.

Sub-hypothesis ii): There is no significant effect of variation in agroecological conditions of villages on their population growth and net migration rates.

Sub-hypothesis iii): There is no significant effect of accessibility on village population growth and net migration rates.

Sub-hypothesis iv): There is no significant effect of the distance between nearest neighbouring villages and their population growth and net migration rates.

Sub-hypothesis v): There is no significant effect of the proximity of a village to the Serengeti National Park on its population growth and net migration rates.

Hypothesis 8: There are no significant differences in the mean distance moved by migrant households according to their major reason (for resources, social, resources-social) for moving.

Hypothesis 9: There are no significant differences in the average amounts of total land and land per capita owned by migrant households according to their major reason (for resources, social, resources-social) for moving.

Hypothesis 10: There are no significant differences in ratings of satisfaction with security, availability of water and wood, access to social services (school, clinic, transport), risk to human health, rainfall, ecological conditions, soil fertility, and the amount of land cultivated between households according to their major reason (for resources, social, resources-social) for moving.

Hypothesis 11: There are no significant differences in migrant household perceptions of their resource, social, economic, food, and life situations when compared to the majority of other people living in their community of origin.

Hypothesis 12: There are no significant differences in access to and use of agricultural resources by the households of non-migrants, and migrants in their places of destination,

and origin:

Sub-hypothesis i): There are no significant differences in the average acreage of land cultivated by the households of non-migrants, and migrants in their places of destination and origin.

Sub-hypothesis ii): There are no significant differences in the mean acreage per capita owned and cultivated by the households of non-migrants, and migrants in their places of destination and origin.

Sub-hypothesis iii): There are no significant differences in the farthest, nearest, and average distance (walking time in minutes) to the plots cultivated by the households of the non-migrants, and migrants in their places of destination and origin.

Sub-hypothesis iv): There are no significant differences in the average ratings of the fertility of plots cultivated by the households of non-migrants, and migrants in their places of destination and origin.

Sub-hypothesis v): There are no significant differences in the mean diversity of land types on the local catena cultivated by the households of non-migrants, and migrants in their places of destination and origin.

Sub-hypothesis vi): There is no significant difference in the use of land types on the local catena by non-migrant and migrant households in their places of destination.

Sub-hypothesis vii): There are no significant differences in the acreage cultivated per capita according to the marital situation of the households of non-migrants, and migrants in their place of destination.

Sub-hypothesis viii): There are no significant differences in the acreage cultivated per capita by non-migrant, and migrant households after relocation according to the variations in the household structure (nuclear, extended-lineal, extended-other)

Sub-hypothesis ix): There are no significant differences in the average number of crops grown by the households of non-migrants, and the migrants in their places of destination and origin.

Hypothesis 13: There are no significant differences in the mean size (number of persons) of the households of non-migrants, and migrants in their places of destination and origin.

Hypothesis 14: There are no significant differences in the access to labour (assistance by relatives, assistance by msaragambo, paid workers) by the households of non-migrants, and migrants in their places of destination and origin.

Hypothesis 15: There are no significant differences in the ownership of oxen and livestock units (cattle, goats, sheep) by the households of non-migrants, and migrants in their places of destination and origin.

Hypothesis 16: There are no significant differences in the proportions of area under crops of different types grown by the households of non-migrants, and migrants in their places of destination and origin.

Hypothesis 17: There is no significant difference in the equity of land ownership and cultivated acreage per capita between migrant and non-migrant households in the destination villages.

Hypothesis 18: There are significant differences in the mean acreages per capita of land owned and cultivated by non-migrant and migrant households, both before and after moving.

Hypothesis 19: Migration status has no significant effect on the variation of per capita ownership and cultivation of land due to differences in gender, age, education, ethnicity and leadership status of the head of household.

Hypothesis 20: Migration status has no significant effect on the variation of per capita ownership and cultivation of land due to differences in the number of adult females, and marital structure (monogamous, polygynous, single, etc.) in the household.

Hypothesis 21: Migration status has no significant effect on the variation in per capita cultivation of land due to differences in access to extra-household sources of labour (msaragambo).

Hypothesis 22: Migration status has no significant effect on the variation in per capita cultivation of land with different farming technologies (use and non-use of oxploughs).

Hypothesis 23: Migration status has no significant effect on the variation in per capita cultivation of land in villages with different net migration trends (rapid out-migration, slow out-migration, little or no net migration, slow in-migration and rapid in-migration).

Hypothesis 24: There is no significant difference in the household evaluation of their life situations in the villages of origin and destination.

1.4 Organization of the Dissertation

The dissertation is divided into eight chapters followed by a bibliography and two appendices. The first chapter introduces the research problem, and defines the main hypothesis and sub-hypothesis of the study of migration and agroecological change in Serengeti district, Tanzania. It also presents the organization of the dissertation. The central thesis of the study contends that there are changes in the 'agroecological locus' associated with migration, in addition to the changes in the 'spatial locus' and 'social locus' (Zelinsky 1971).

The second chapter reviews the literature and observes that there has been little systematic analysis of the importance of migration in agricultural development although population movements and agriculture have been pivotal in the history and development of African societies. It presents a model of population growth, migration and agroecological development. Chapter three defines the study area, the political and administrative organization, the ecological settings and the socio-economic characteristics of communities, hence the contextual settings of rural migration, in the Serengeti district. The study of population change and land use is necessary for planning and managing rural development and ecological conservation.

The fourth chapter first presents the sources of data and methodology used in the analyses of population trends and estimates of net migration at the aggregate level. Next, it describes the sampling methodology and the field survey instruments used to collect data on the demography, social system, economy, ecology, agriculture, resources, and development issues on the meso-level of villages, and the micro-level of households. The chapter also outlines the main techniques used to analyse the survey data and model the relationship between migration, agriculture, environment and socio-economic development.

The following three chapters are the substantive core of the dissertation; they present and discuss the results of the data analyses. Chapter five focuses on the change

in the spatial locus associated with migration. It describes the patterns of population growth and population redistribution, identifies the regional and local migration fields, and examines the relationship between the volume of migrants and distances moved. Migration is one of the most obvious links between people and places in the Serengeti district and eastern Lake Victoria.

The sixth chapter outlines the determinants of migration at the meso-level (village), the reasons for moving at the micro-level (household and individual), and the sources of information used by migrants and their processes of relocation. The potential for migration, and factors that shape potential intentions to move are also briefly considered. An important section of this chapter describes the role of local village governments in regulating in-migration in the Serengeti district.

Chapter seven first describes the processes of how migrant households gain access to resources, especially land, and re-establish their homes and agriculture in their destinations. Next, it examines the change in the 'agroecological locus' associated with migration. Migration research has emphasised the analyses of the spatial and social change, readjustment and adaptation, and assimilation of migrants in their host communities (Goldscheider 1971). Issues of agroecological change and readjustment to them have remained poorly understood. The chapter presents models of the inter-relations between land ownership and use, and the household demography, proximity to the household's plots and their location on the local catena, and access to labour. Finally, the role of migration in processes of rural differentiation is also examined. The final and eighth chapter presents a summary of the major research results, and discusses their theoretical, methodological and public policy implications. It also notes the limitations of the study and makes suggestions for some future research work. Appendix I presents population data on the villages of Serengeti district, and Appendix II consists of the village-level and household-level questionnaires. The household questionnaire is in both KiSwahili and English.

Chapter Two

Migration, Agroecology and Development: Literature Review

The origins of migration theory have been attributed to Ravenstein (1885, 1889) and since then there has been a fundamental change in its conceptual orientation from the classic concern with the relocation of individuals to several new approaches that are more historical, structuralist, global and critical (Zolberg 1989). Development theory has, since its genesis in the post-World War Two period also undergone profound changes, many that parallel and have facilitated the trends in migration analysis. Classical and neoclassical economic theory, and their conceptualizations based on individual economic behaviour, are no longer adequate to explain and guide the challenge of socioeconomic development. Humans have evolved to be more complex than the assumptions of 'economic man'. While the origins of agriculture pre-date those of migration and development theory by several millennia, a second agricultural revolution appears to have become necessary if the world's poorer peoples are to be fed adequately and sustainably. This challenge is especially great because of the rapid increase in the global population, particularly in the rural areas of developing countries.

Agricultural development is viewed as an integral, if not a necessary, requirement of socioeconomic development (Misra and Dung 1986). Yet, the interrelations between migration, development and agroecology remain little understood. Mollett (1991:1-2) has noted that "to trace the whole pattern of agricultural development to modern times (an immense task!) is to follow the path of human history in all its great variety" but "very little research has been done into the impact of migrants on agricultural development". White and Woods (1980:53) similarly observed that "The impact of migration on agriculture is a major field and one that has not been fully explored".

This chapter reviews some selected literature that deals with the interrelations between migration, development and agroecology. The first section of the chapter considers the approaches to the study of the determinants and consequences of migration. The second section examines the determinants and theories of migration, and the third

section deals with the consequences of migration. Section four of the chapter briefly reviews the approaches that focus on the linkages between migration and development. It concludes that very little of the migration-development theory has systematically incorporated issues of mobility transitions within agrarian societies and the ecological context in which population movements of mainly subsistence agriculturalists take place. The last section outlines a general model of population growth, migration, environment and agroecological development.

2.1 Approaches to the Study of the Determinants and Consequences of Migration

Migration can be both a cause and consequence of changes in socioeconomic systems (Simmons et al. 1977, Nurun Nabi and Krishnan 1993). The study of migration, like that of fertility, is sensitive to the level of the analysis. Studies of the determinants and consequences of mortality, in contrast, need not always require microlevel explanations and involve normative propositions (Goldscheider 1971:33). An additional problem in the study of migration involves the definition of migration. Several different conceptual approaches have been used in the analysis of the determinants and consequences of migration. Goldscheider (1971:33) suggested (i) categorization of the many factors that cause or have impacts that result from migration (e.g. Bogue 1959); (ii) construction of typologies of the types, duration, causes and consequences of movements (e.g. Petersen 1958, Krishnan and Odynak 1987, Gould and Prothero 1975); and, (iii) model building (e.g. Lee 1966, Stouffer 1960) and paradigms (e.g. Zelinsky 1971, 1979; Brown and Sanders 1981).

2.2.1 Determinants and Theories of Migration

The question, "Why do people move" ? is one of the most important asked in migration research (Kosiński and Prothero 1975) and yet little understood (Jansen 1969). Kosiński and Prothero (1975:12) concluded that "The causes for human migration are extremely diversified. Only rarely can a move be attributed to one cause since in most cases several reasons can be identified. However, various situations can be identified

which stimulate migration decision". The study of the determinants of migration has been carried out with different, but overlapping, perspectives (Lewis 1982). Woods (1982:132) stresses that scale is an important conditioning factor in analysing the determinants of migration. However, integration of analyses conducted at different conceptual and spatial scales is a major problem in migration research (Zelinsky 1983, Cadwallader 1992).

Germani (1965) suggested three levels of analysis of the causes of migration: (i) objective, (ii) normative, and, (iii) psycho-social. The objective level analysis focuses on the macro scale and infers the determinants of migration by studying the patterns of population movements and the environment in which the movements occur. For example, if a flow of people is observed to occur from a densely populated highland area to its less populated surrounding lowlands, it may be inferred that the migration was because of population pressures in the highland and for land. Generally, the data used in the objective level of analysis are derived from aggregate compilations, for example censuses. But inferences derived from aggregate level data impute, rather than explain, the actual causes of movement of people. Nor does such analysis illuminate the factors that may have constrained or facilitated the individuals in their movements.

The normative level of analysis is concerned with the meso scale of the society or communities and the context that shapes and within which people make their decisions to move. The societal context includes factors like, for example, the beliefs and values, expectations and institutional roles. Its most common approach is to pose the questions "Why did you move?" to migrants to understand the causes of migration, and "Why did you choose your present residence?" (Lewis 1982:103) to understand the contextual factors that shaped their migration decisions. Studies of migration differentials, that is differences between migrants and those who did not move in various areas, have been used to identify the potential contextual settings of migration and staying (De Jong and Fawcett 1981). Such analyses also fail to explain the motivations of people to move.

The psycho-social level of analysis of the determinants of migration attempts to understand, at the micro scale of individuals, their attitudes, expectations, migration decision-making processes, the various forces that motivated the desire to move and the factors that may have facilitated or constrained migration. Much of this analysis focuses

on the behavioural aspects of migration. Lin-Yuan and Kosiński (1994) have presented and discussed the different types of migration decision-making strategies used by people. Both the normative and psycho-social levels of analysis generally use data collected in special migration surveys to test the validity of theoretical models of migration.

Several theories of migration have emerged, often developed in isolation and segmented by disciplinary perspectives (Massey et al. 1993). Their different concepts, assumptions and frames of reference, prompted Zelinsky (1983) for example, to suggest that migration research had reached an impasse because of the lack of a unified theoretical framework. The theoretical diversity is the consequence of a number of problems such as: (i) the variation and complexity of patterns of behaviour, interaction and population movements in diverse social circumstances; (ii) the differences in the definition and meanings of the phenomenon of mobility and migration among researchers; (iii) a lack of universality in the sources of data and methodologies for measuring and analysing population movements; and (iv) the complex linkages between the patterns and differences in migration behaviour as these have varied with changes in social settings over evolutionary and historic time, and in local, regional, national and global space (Nurun Nabi and Krishnan 1993).

However, some integrating and common perspectives are emerging. Wood (1982) identified two major conceptual schemes in migration theory, each of which has various models: (i) economic equilibrium theory, and (ii) historical-structuralist approaches. They deal with the micro-level and macro-level of migration analysis. According to Nurun Nabi and Krishnan (1993), the several approaches to understand the determinants of migration can be summarized as: (i) economic (e.g. Sjaastad 1962, Shaw 1975, Todaro 1976), (ii) spatial (e.g. Zipf 1946), (iii) behavioural (e.g. Wolpert 1965, Taylor 1969); and, (iv) mathematical (e.g. Lowry 1966, Shaw 1975, Kemny and Snell 1962, McGinnis 1968, Rogers 1968, Krishnan and Lalu 1981). The mathematical approach may be based on theory, or derived statistically. Both logical and empirical evaluation are involved in sorting out which particular theory or model (or combination of theories and models) is appropriate to specific migration situations.

2.2.2 Economic Equilibrium Theory of Migration

Economic equilibrium theory applied to migration is of two main sub-types: neoclassical macro theory, and neoclassical micro theory (Massey et al. 1993). The macro-economic, labour-force adjustment model (Brown and Sanders 1981) was first developed to explain movements of labour during the processes of development (Lewis 1954, Ranis and Fei 1961, Todaro 1976). The model posits that migration is the consequence of geographic differences in the supply and demand of labour which causes differences in wages between areas. People move to obtain the higher wages and the increase in labour supply causes a decrease in wages towards an equilibrium between labour demand and supply. When there is no difference in wages between places, migration ceases. The approach considers geographic and socioeconomic inequalities as an inevitable outcome of development. Lowry (1966) applied the model to labour migration in the United States.

This theory has been extended to consider migration as a response to differences in the geographical distribution of land, capital, and/or natural resources (Dumon 1989). Thus, Wong (1981) demonstrated that net migration among the districts of Sri Lanka was a function of agricultural change and the differences in their agro-climatic condition. Agricultural change was operationally measured as changes in the total area of crops, percentage change in the value of tea, paddy, coconut and rubber production, and percent change in male workers per hectare of agricultural land. The agro-climatic condition depended on whether the district was located in the country's dry or wet zone.

Micro-economic theory posits that migration is the result of rational individual choices made from a cost-benefit analysis of net economic returns in different locations (Sjaastad 1962, Todaro 1969, 1976). It views migration as an investment in human capital and is often called the human resources model of migration (Simmons 1993). Each person evaluates his/her skills and income in the place of current residence against the employment possibilities and expected incomes in other places and moves to the location where the expected net economic benefit is maximized. The cost-benefit evaluation also considers the monetary, physical and psychic, etc., costs involved in moving, finding employment in the new destination, adapting socially and

psychologically and foregoing the current income. Brown and Moore (1970) applied such a model to intra-urban movements and social mobility. However, obtaining appropriate data on estimates of future earnings and migrant perceptions of future earnings remains a major problem of operationalizing the model. Without such information, the conceptualizations of the labour-force adjustment and human capital models are difficult to distinguish clearly (Brown and Sanders 1981:159).

In contrast to the individual focus of the human capital approach, the 'new economics of migration' (Massey et al. 1993) posits that migration decisions are not made by individuals in isolation and solely towards maximizing benefits to the migrant alone. Instead, cultural defined production and consumption units, for example families/households (Wood 1982, Harbison 1981), act collectively to make migration decisions not only to maximize income, but to minimize risks (both objective and subjective), and deal with problems and failures resulting from the operation of other markets apart from that for labour (Massey et al. 1993). For example, a household in the rural area of a developing country may send a member to work elsewhere in order to obtain income to supplement its subsistence cultivation and as protection against crop failure, poor crop prices, for trying out a new seed variety, accumulating bridewealth, etc.

In addition, households may not only use migration as a mechanism to improve income in absolute terms, but also to increase their income relative to other households, that is to reduce its 'relative deprivation' compared with other households (Stark 1984, Stark, Taylor and Yitzhaki 1986). But like the macro and micro economic approaches, the 'new economics of migration' approach is based on concept of the individual as the migrant. Yet, migration in the rural environment frequently involves the household or family group, excepting movements for marriage (Vlassoff and Rao 1994, Ominde 1975).

The equilibrium theoretic paradigm has been criticized for a number of reasons. First, people do not have complete information about the various economic and other types of opportunities in different places. Thus, migration decisions may be more likely made with selective or bounded rationality (Leibenstein 1976, Lin-Yuan 1993), depending also on individual capacities to make use of the available information (Hugo 1981).

Decision outcomes under perfect information may differ significantly from those under imperfect information (Goodman 1981). Second, individuals do not necessarily make choices that maximize their benefits but instead aim to minimize risk or achieve a certain level of satisfaction (Simon 1957, Lin-Yuan and Kosiński 1994) with the benefits of migration. Third, people make migration decisions which involve both objective and subjective appraisals of the utilities (Wolpert 1965) of the place of origin and destination (Da Vanzo 1981). Although the micro-approach can accommodate subjective appraisals of place utilities, the migration decision outcomes may not be the same as with objective appraisals (Goodman 1981). Fourth, appraisals of costs and benefits or migration intentions do not always result in actual movements, nor are a particular level of income and benefits valued equally by all persons (Massey et al. 1993). Finally, there may be restrictions that constrain the choices of individuals to move freely in response to perceived potential benefits as a result of government and other policies. Social ties, moral obligations, and cultural traditions also may inhibit a person from moving to maximize income.

2.2.3 Historical-Structuralist Approach to Migration

The historical-structuralist approach conceptualizes migration as a process resulting from structural organization and changes (political, social, economic, etc.) in the society. It emphasizes the factors that shape migration decisions instead of individual attitudes and aspirations as the main causes of decisions to move. One variant of the approach views inequalities as the consequence of cultural power (e.g. patriarchy) and institutional power (e.g. social and political elites) (Simmons 1993) and draws from several sources, for example Marxian theory, the Latin American dependency school, and the work on colonial economies in Africa (Amin 1974). Another variant of the historical-structuralist perspective is seen in modernization theory (Rostow 1960) and draws from neoclassical economics.

The world systems model in the historical-structuralist paradigm conceptualizes migration as an outcome of the penetration of capitalist economic relations into non-capitalist peripheries (Wallerstein 1974, Massey et al. 1993). This penetration has

proceeded since the sixteenth century to create a world market system in which capitalist firms seek the means, for example land, labour, raw materials and consumer-markets, of making profits and accumulating more wealth. Colonization, the operations of multinational firms and capitalist elites in developing countries, cash crop farming, the extraction of raw materials, assembly of products, the flows of goods and capital, ideological and cultural links, are among some of the processes and agents of the expansion of the world market system. People move within and between countries in response to the organization and activities of an expanding world market.

Another historical-structuralist perspective of migration is the dual labour market theory. Piore (1979) suggested that the intrinsic demands of labour in industrial economies generates the movement of people, especially on the international level. Within developing countries, a similar process of movement is initiated by the enclaves of modern, industrial economy. The inherent duality between capital and labour creates conditions for migration. This dualism is perpetuated by recruiting arrangements that provide firms with low-wage labour through contracts and by government policies that restrict the free flow of labour in response to flows of goods and capital.

Rao (1986) suggested a model of development-deprivation associated with migration that contrasts with the world systems and dependency conceptualizations of capitalist penetration into a periphery. In this model, farmers move into an area and introduce agricultural techniques that benefit them. Their host communities become marginalized and relatively deprived. The process of development-deprivation differed from the exploitative relations described in world systems and dependency theory. Instead, the immigrant farmers were medium and small land-owners, the conflict was more due to ethnic, caste, and migration status than class differences, and the process of development-deprivation took place within the same territorial unit and did not involve a spatial core juxtaposed to a periphery.

The macro-level determinants of migration can be proximate or structural (Conway and Shrestha 1981:106-107): "Proximate variables are middle-order level variables which seek explanation on a surficial level in that often they are the consequences of underlying determinants", for example urbanization, agricultural income, industrialization, etc., and

"Structural determinants are the basic or underlying causes of migration", for example investment patterns, land-tenure patterns, productivity. Freedman (1979) has distinguished between contextual variables and setting variables among macrofactors affecting migration. The contextual data represent the average values of a variable for the population or community, for example the average education level. The setting variable affects all the members of the population, for example climate, political system, etc.

2.2.4 Cumulative Causation of Migration

Factors that initiate migration differ from those that perpetuate it across space and time (Massey et al. 1993). Migration may be initiated by wage differentials and an individual desire for income and greater gain, in an attempt by households to diversify risks to their income, because of capitalist market penetration into subsistence economies, or due to the needs of low-wage labour in developed industrial economies. A combination of these factors may also operate jointly to cause migration. Such migration causes new conditions, which in turn, perpetuate movements across space and in time and also become independent causes of migration. The processes and impacts of migration generate a positive feedback through intermediate factors, for example migrant networks that connect those who move with others who follow, institutions that recruit migrants for work, and processes of cumulative causation (Myrdal 1957).

The main factors of cumulative causation that perpetuate additional movements are the distribution of income, the distribution of land, agricultural organization, culture, the regional distribution of human capital, and the social meaning of work (Massey et al. 1993:451). In poor and subsistent rural economies with abundant land, there is little income inequality. Collier et al. (1986) found off-farm income and possession of livestock to be important factors causing social differentiation in Tanzanian villages but land ownership was not so important because it was generally available. Some persons may migrate to work and their remittances to their households may make other households in the community feel a sense of relative deprivation, thus prompting them also to undertake migration. This cycle would have cumulative effects in which migration

generates income inequalities, relative deprivation, and in turn, more migration.

Similarly, inequalities in the rural distribution of land may cause out-migration, especially of those who are landless, or with inadequate amount of land to satisfy subsistence needs, or who can no longer work the land as renters, share-croppers, etc. Connell et al. (1976) found inequalities in the distribution of land to be a major cause of rural-rural migration among Indian villages; Abeysekera (1984) also found a similar effect among Sri Lankan migrants; and, much of the migration from the Nepalese hill areas to the lower 'tarai' lands was by the landless and those with inadequate and poor plots of land (Conway and Shrestha 1981). The majority of in-migrants in the Rondonia (Brazil) frontier settlements consisted of former small landowners, the landless, share-croppers, and rural labourers expelled from areas into which the minifundia spread or due to rapid commercialization and modernization (Henriques 1985).

The organization of agrarian production may also be a major cause of migration. Balan (1983:181) attributed migration to and from the rural areas of Latin America as the "consequence of the expansion and contraction of economic opportunities in the countryside" and specifically "the characteristics of the social structure-mainly the organization of production in areas of origin and destination". In his view, the patterns of internal migration in Latin America in the past century were the consequences of, first, increased agricultural commercialization, and, later, of industrialization. In contrast, Vlassoff and Rao (1994:113) found that agricultural development and commercialization reduced out-migration from villages to urban places and instead promoted return migration and rural retention of population in Maharashtra (India).

Migrant networks link migrants with those who preceded them and with those who have not yet moved in areas of origin and destination through various types of social ties (family, kinship, friendship, common locality of origins, race, etc.). The first migrants may incur the highest costs of moving and re-establishing in a new destination. But their presence and support will make the costs and risks for those who follow considerably less. Return migrants may bring new values and tastes, life styles and motivations (Piore 1979). Previous migration experience may also increase the likelihood of future movements (Findley 1987). Such a network and process of 'chain-migration' may even

become a part of the cultural system and rite of passage in some societies (Hugo 1981). A culture of migration may then emerge at the community level. People may then move in a circulation system through their network over large distances (including inter-continental) and for variable periods of time.

The processes of cumulative causation often initiate and exacerbate the inequalities in the geographic distribution of human capital. Selective migration of the adult, better-educated, productive and motivated people may drain the areas of origin of their human capital essential for agricultural and rural development and accumulate it in the destination areas where the availability of increased human capital facilitates development. The development disparities lead to further out-migration with 'backwash effects' (Myrdal 1957) on the areas of origin.

Given the variability in the composition and characteristics of migrants of different types of population movements, Bogue (1969) suggested that selectivity for age is perhaps the only universal characteristic of migration. White and Woods (1980:12) have generalized that "migrants are not a random selection from the population of the place of origin", and, "migrants do not form a random cross-section addition to the population of the place of destination". However, the establishment of migration networks over time may make the costs of chain migration low enough that selective migration ceases (Massey et al. 1993). In rural-rural population movements, migration may not be as selective as are rural-urban and international movements because entire households may dominate the population flows (Vlassof and Rao 1993, Ominde 1975).

The results of numerous studies have indicated the complexity of the determinants of migration. A number of authors have listed or attempted to summarize the various factors determining migration into more comprehensive categories. For example, Ravenstein (1885, 1889) and Lee (1966) suggested that economic fluctuations determined the volume of migration, George (1970) ascribed migration to needs, including economic ones, that pushed people out from or attracted them to certain areas, and to obligation or necessity of people to move from an area because of push factors, for example religious or political persecution.

Bogue (1959) grouped the main causes of migration as the socio-economic conditions (e.g. investments, technological change, migration regulations), factors that stimulated migration (e.g. marriage, employment, natural disaster), and factors determining the choice of migration destinations (e.g. social ties, costs of moving, information). Findley (1977) has distinguished economic factors, demographic factors, life-style factors, and institutional factors as determinants of migration.

Population redistribution may occur to maintain an equilibrium between population size and life chance (Hawley 1968) depending on the levels and changes in technology, environment, organization, and population. More specific ecological determinants of migration may include the attraction of people associated with the diversity of resources and opportunities arising out of ecological variation (Gould and Prothero 1975) and, the repelling effects on people of environmental deterioration and population pressure (Mabogunge 1970, Kosiński and Prothero 1970). Pryor (1975) differentiated autogenic (voluntary) movements caused by macro-level economic, institutional and political, demographic, sociocultural, and other micro-level, behavioural and idiosyncratic factors and stimuli initiating migration from the allogenic (in-voluntary) movements impelled by political and institutional forces (e.g. population transfers, refugee movements, etc.) and environmental 'push' factors such as floods, droughts, soil depletion, etc.

Sociological factors may also be important determinants of population movements. Migration may be undertaken as an adaptive process aimed at maintaining the dynamic equilibrium of social organization, minimize changes and overcome deprivations (Mangalam 1968). People may move to maintain ties with family, friends, kin and community (Ritchey 1976) or because of necessity or obligations e.g. religious persecution or care of aged, and due to personal life-style preferences (De Jong and Fawcett 1981) and the need to enhance individual freedom (Zelinsky 1971). People may also not move because of their affinity to family, friends and communities in places where they live (Ritchey 1976).

Social and economic conditions, and individual characteristics may have joint effects in stimulating migration. People have moved because of demographic, sociocultural and socioeconomic differentials, for example in age, sex, education, ethnicity, and due to

changes in life-cycle stage, family size, employment status (Bogue 1969) and needs e.g. income (George 1970). People may move because of a lack of rural educational and occupational facilities for advancement and to improve social status (Findley 1977, Davis 1963), due to differences in investment patterns and access to markets (Simmons et al. 1977), and opportunities in the informal labour market. In rural areas, the lack of non-farm and small-scale enterprises (Brown and Sanders 1981), land tenure and rural inequalities (Connell et al. 1976, Collier et al. 1986), poverty (Hutton 1973) and deprivation (Stark 1992, both absolute and relative (Williamson 1991), may be important determinants in causing migrations to urban and other rural locations. Mitchell (1969) suggested that economic factors were perhaps the necessary conditions for migration while social and life-style factors were sufficient conditions that regulated the incidence of movement, at the micro-level.

The macro-level approach to the economic analysis of the determinants of migration emphasised the social and environmental causes of population movements and imputed, if not ignored, the motives of people, either individuals or families, for moving to other places. Bogue (1977) noted that the macro-level "push-pull" model of migration behaviour was less useful for understanding the motives of migration at the micro-level. Instead, an approach that took into account the individual's or family's cost-benefit or value-disvalue assessment or perceptions of economic and noneconomic factors in migration decision-making was needed.

Lee (1966) combined the macro and micro levels of analysis and conceptualized the determinants of migration as 'push' factors in areas of origin, 'pull' factors in areas of destination with intervening obstacles in-between which interact with the personal characteristics of migrants. Thus, macrofactors as determinants of migration can be broadly divided into two types: factors that stimulate as well as constrain out-migration from areas of origin, and factors that attract and/or constrain people from moving to other areas.

In contrast, De Jong and Fawcett (1981) focused on the micro-level analysis of the determinants of migration and considered people's motives for moving from and staying in areas. Their value-expectancy model considers both individual and household

demographic characteristics and personality traits, societal and cultural norms, and differentials between areas in opportunities as important factors which, in turn, influenced the individual values of wealth, status, comfort, stimulation, autonomy, affiliation, and morality in motivating migration. The model attempts to link and integrate, through feedback processes, the value-expectancy perspective of migration decision-making with the diverse micro-, meso- and macro-level determinants of migration.

According to De Jong and Fawcett, migration decisions, when taken voluntarily, are motivated by a fundamental desire to "maintain or improve the quality of life for the individual or family" and arise from the "dissatisfaction with the present situation, as manifested in the perceived disparity of opportunities and the expected improvements that would result from migration, whether these opportunities are in income, status, affiliations, or other aspects of the social or physical environment" (De Jong and Gardner 1981:4).

Migration may be determined by the intervening opportunities in space (Stouffer 1940, 1960) and various factors may constrain migration (Lee 1966), for example, distance, physical barriers and obstacles, ties to family, kin, friends and community, the lack of information about other places, fear or apprehensions about coping with social, economic and environmental change, and political obstacles restraining movements of people (Gardner 1981). Much of the spatial approach towards understanding the determinants of migration, for example the gravity model types of analyses, has focused on the inhibiting effects of distance on population movements. The availability of opportunities, which are not equal for all persons, also affect individual and household decisions to migrate.

In addition, government policies towards migration may be negative, accommodative, manipulative, and preventive (Gardner 1981). Negative policies aim to restrain or block migration, accommodative policies seek to minimize the negative impacts of migration in and out of places, manipulative policies may even encourage but redirect migration to desirable areas, and preventive policies attempt to deal with the root causes, for example poverty, unemployment, in areas of out-migration and reducing the strength of

'pull' factors attracting migrants to places.

2.3 Consequences of Migration

Much of the theoretical work has focused on the patterns and determinants of migration; thus, there is a lack of general theories and models about the consequences of migration (Simmons 1982, Nurun Nabi and Krishnan 1993). Lewis (1982) suggested that migration had demographic, economic, social, cultural and political consequences at the individual, community and societal scales. White and Woods (1980:43) observed that the effects of migration occur in five specific contexts: on the migrant, on the community of origin, on the community of destination, on the intervening space through which migration occurs, and on the structural context within which migration takes place. In fact, the causes and consequences of migration can be interactive. Their prediction is of importance in planning and formulating public policy, for example in the provision of social services (Kosiński and Prothero 1975). The consequences of migration on areas of origin and destination vary depending on the volume, demographic structure and rapidity of population in-flow and out-flow.

At the macro-level, the most identified consequence of migration is the rapid growth of urban areas in developing countries. People may go to urban centres in the hope of achieving improvements in their socio-economic status. But assessments of such improvements at the societal level may be overestimated because of selective return of less successful of the migrants to their areas of origin. In rural areas, out-migration has generally been associated with the reduction of population pressures, landlessness, unemployment and underemployment in areas of origin, and the expansion of the settlement frontier (Shigeaki 1991), introduction of new crops, farming technologies and organization in destination areas (Thirsk 1991, McQuillan 1991).

Mollett (1991:1) contends that "rural migration, both spontaneous and forced, involving land settlement can be, and often is, a positive force in agricultural development". But not all migration is successful in reducing population pressures and mitigating rural problems (Nurun Nabi and Krishnan 1993), or bringing about a beneficial equilibrium between the sending areas, receiving areas, and the people

involved. Rao (1986) found that the in-migration of Kamma farmers from the delta area to the hill tribal lands of West Godavari District (Andhra Pradesh, India) led to agricultural development that benefited the migrants but led to deprivation among the resident Koyas. The development of agriculture mainly resulted from the Kamma farmers introducing irrigation, improved land management and entrepreneurship. The Koyas suffered from land alienation, and forest laws that prohibited them from hunting, gathering and fishing. This forced them to become agricultural labourers, farm servants, and to migrate out in search of employment.

Out-migration may drain the area of origin of its most able-bodied members. Selective out-migration of adult males has often resulted in the tasks of agricultural work being left on the aged, the young and women, and with a consequent reduction in the productivity of the agriculture. According to Isaias (1989), migrants may induce social, economic and political problems in their destination. The in-flow of people may cause population increases with consequent adverse effects on existing social institutions and stability: it increases the demands for goods and services which may already be scarce and, it may displace the members of the host community from employment and cause the deterioration of rural salary structures. Among the social and cultural impacts are the diffusion of immigrant culture into host area and the loss of customs and traditions by local population.

In-migration may also lead to the introduction of diseases and pests which may have devastating effects on both the migrants and the host communities. The mechanisms involved also vary; for example, infected persons form the reservoir for malaria and bilharzia; the spread of sleeping sickness may involve humans, and also wildlife and cattle (for nagana), and rinderpest affects both domestic and wild bovids. Social problems may also arise from in-migration, especially if there is a failure to integrate and assimilate migrants into the host society. Migrants may also reject assimilation and could become marginalized socially, politically and economically, which in turn has adverse political consequences. The ecological outcomes of migration impact upon an area of settlement depend on the interaction between the type and intensity of human activities, and the resilience of an ecosystem to withstand such impacts without environmental

degradation (McNicol 1990).

At the micro-level, migration may be aimed at improving the welfare of the individual who moves, for example to obtain employment or education. Social factors may also determine the movement of individuals, for example marriage, and the desire to reunite with their family and kin. Migration may also result in adverse impacts on the individual (Nurun Nabi and Krishnan 1993) who may become distressed, experience disorganization in everyday life, and even become mentally ill because of moving and having to cope with the changes in the social, spatial, etc. loci. The type of forces impelling the move, forced as opposed to voluntary, and the support systems to enable migrant individuals to re-establish and lead fulfilling lives can determine the overall socio-psychological outcome of the move.

The consequences of migration at the meso-level of the household or family and its structure are also multiple (Dumon 1989). The societal and individual level consequences of migration are usually mediated through the household or family. For example, population pressures are felt by households long before they become apparent at the aggregate level, and a household has to adjust to the loss of a member who moves away (Mabogunje 1970). In turn, changes within the household, for example expansion in its size increases the likelihood of out-migration from the household (Goldscheider 1971). During the colonial period, selective out-migration of adult males as labourers and for long periods of time had detrimental impacts on family reproduction and even reduced fertility rates below replacement levels in some areas (Okoth-Ogendo 1989). Since taxes were often equal to wages paid to the labourers, there was little remittance sent and invested in the places of origin.

2.4 Approaches to Integrating Mobility and Development

Attempts have been made to draw together the various conceptual approaches, theoretical models, and the complex results of migration studies by deriving typologies and by using the concept of migration systems. Several generalizations of this type have been developed by migration researchers. Typologies are derived by ordering, structuring, and classifying types, causes, mechanisms and impacts of migration.

Although they are descriptive rather than explanatory, typologies are useful as building blocks for deriving theories and laws (Nurun Nabi and Krishnan 1993). The migration systems approach is most useful for defining the linkages between migration and other social processes, and the feedbacks (positive and negative) involved. But the data needs and the task of identifying the cause-effect links between migration and social change are most demanding. Longitudinal studies would be essential to understand the nature of the dynamic processes of mobility and development, as affected by spatial and temporal lags.

Several typologies of migration have been proposed using different criteria (Kosiński and Prothero 1975, Nurun Nabi and Krishnan 1993), including the determinants and consequences of migration. Gould and Prothero (1975) derived a space/time typology of African mobility that also differentiated the movement of people according to economic and noneconomic motives. Diseases may cause movement or be spread by migration (Prothero 1965). Petersen's (1958) typology of migration identified ecological push, migration policy, higher aspirations, and social momentum as major factors that initiated migration. Their outcomes were categorized as conservative or innovative, but it remains unclear from whose perspective is the nature of the migration outcome to be assessed (Nurun Nabi and Krishnan 1993).

Krishnan and Odynak (1987) have presented a generalization of the Petersen typology by incorporating a temporal dimension and taking into consideration the state of mind of the migrant. It also took into account those movements that result in a deterioration of the socioeconomic condition of migrants. Hence, the state of mind of the migrant may be of the upward, stationary, and downward types. Nurun Nabi and Krishnan (1993:102) added a fourth state of mind, the 'state of indifference' towards the move; migration may also be undertaken by people without them considering the expected outcome in their status. They also stress that previous typologies have failed to consider the interactions between humans, for example the social relations of production, that may be important causes of population movements in agrarian countries. Balan (1983) found that the social relations of production was a major determinant of migration into and from the rural areas of Latin America.

Among the migration systems approaches are those of Brown and Moore (1970) for intra-urban individual movements, Mabogunje (1970) for rural-urban movements, Zelinsky's (1971, 1979) hypothesis of mobility transition and Pryor's (1975) paradigm of migration processes as associated with modernization. Brown and Sanders (1985) have advanced a migration and development paradigm. The underlying perspective of the migration-development models is Zelinsky's (1971:221-222) contention that "There are definite, patterned regularities in the growth of personal mobility through space-time during recent history, and these regularities comprise an essential component of the modernization process". These models focus primarily upon internal population movements and processes of national development. Richmond and Verma (1978) have proposed a global systems model of internal and international migration. It takes into account movements within and between industrial and post-industrial economies and between developed and developing areas of the world.

Migration-development frameworks that focus on the rural, agricultural areas of the world are beginning to emerge. Mollett (1991:7) has identified two main problems in "attempting to generalise and develop theory about the role of migrants in agricultural development: the often large numbers of variables which enter the picture, and lack of adequate, accurate and relevant data". According to him, some of the factors that influence the success or failure of particular migrations include opportunity costs that enter into decisions to move, the type of migrating unit (individual, family/household, etc.), market forces and changes in farm prices that determine the rewards that accrue to migrants, the law of diminishing returns as it affects returns for investments in land, labour and technology and its stimulus on rural migration and agricultural intensification, the effects of economies of scale as these influence areas and activities where people move to and their chances of success, and equality of opportunity that has social, racial, political and economic implications.

Mollett (1991:222) concluded from his review of migration related agricultural development case studies that "responses of the majority generally follow a similar pattern irrespective of differences in ecological setting, local production systems, culture, and state, or government policies. The most common feature is the division of the

settlement process into an initial phase of exploration and uprooting and, of 'settling-in', which is never less than two to three years (and could be much longer), and a subsequent development phase. As the migrants appraise their farming problems and opportunities, it is in this second phase that innovation takes place. It could, however, be a long time coming". Choudhury and Bhowmik (1986) have suggested that adaptive processes in places of migration destination are determined mainly by the type and number of migrants. Thus, labour migrants from Bihar to tea plantations of West Bengal involved mainly families and have retained their separate cultural identity because of their large numbers and proximity. In contrast, those who moved and cultivated land in West Bengal dispersed, became more Hinduised and more assimilated into their regional social and political milieu.

An important omission in the various migration-development conceptualizations is the lack of an explicit treatment and integration of the environmental dimension. Migration and migration decisions do not occur in an ecological vacuum. Harbison (1981:229) observed that "The specific nature of the links between the individual, the family, the society, and the environment determines the direction of their impact on the migration decision". Thus, the characteristics of the natural environment may affect the household decision to move or to stay depending on the direction of their direct impacts (for example, the inability to withstand the cold), and as indirectly mediated through the household agroecological system (for example, inadequate amount of land and the failure of harvests because of frost, etc.). Choudhury and Bhowmik (1986:340) have noted that "the direction of the migration stream depends not only on the value placed on the opportunities at the destination, but also on the nature of ecological compatability that may exist between the places of origin and destination of migration". According to them, "ecological consideration and economic opportunities decide the volume and direction of migration" (p341) of Bihari migrants to West Bengal.

Ecological similarities and differences also have an important role in influencing the types and processes of adjustments and adaptations made by migrant agriculturalists in their destinations. Initially, both American and European immigrant farmers replicated their farming strategies from the central Mississippi lowlands in what they thought was

a similar environment in the margins of the American Great Plains (McQuillan 1991). Subsequently, Mennonite farmers were able to use their greater 'environmental acumen' and 'agricultural heritage' from farming experience in southern Russia to successfully overcome the problems of drought in central Kansas that were similar to those in their areas of origin. In contrast, the ecological know-how of Swedish and French-Canadian farmers from their Swedish and Canadian (St. Lawrence valley) environments was less useful for adjustment and adapting to conditions in central Kansas. Eventually, the other farmers began to follow Mennonite farming strategies.

According to McQuillan (1991:127), in areas of marked differences in agricultural ecology, the agricultural heritage of settlers is of special importance. 'Agricultural heritage' includes "technological skills of farmers, their familiarity with crops, livestock and machinery that make up expertise in farming experience. Agricultural heritage also includes managerial skills in the allocation of capital, ... Perhaps most important of all, agricultural heritage included an environmental intuition or understanding of how crops would grow in a new region with its distinctive climate and soils". Pioneer farmers in Hokkaido carried out their own experiments with traditionally grown types of rice to determine the varieties most suited to the local ecological conditions (Shigeaki 1991). Later, the government established a breeding farm to scientifically develop the appropriate varieties of rice and support the development of agriculture. Migrants may also obtain valuable knowledge from their host populations that may ease their adjustment and adaptations to their destination areas: for example Puritan immigrants in north-east United States obtained help from native Americans, and Amazon settlers have been assisted by the indigenous Cabloco people (Mollett 1991).

A second important problem is the implicit 'urban' and 'modern' bias in the migration-development models and the cursory consideration of mobility and development transitions in pre-industrial, agrarian societies. Mobility and migrations, including continental scale movements, were integral features of the dynamics of commercially active pre-colonial African societies; rural population movements for subsistence and non-economic reasons are significant in African mobility; and pastoralists have and continue to contribute to the subsistence and incomes of their own and non-pastoralist

communities, and to the economy of several countries through exports of livestock. All these features and activities also have an ecological context.

Abusin (1985) has outlined a general systems model of mobility transitions in developing societies, including transitions within and from nomadism and the peasant economy, and into the modern agricultural and industrial sectors of the economy. The model recognizes that ecological 'push' and ecological 'pull' are a migratory force, that ecological changes, local or regional, "frame the national transition process" (p252), and that the sequence of mobility transition in north and central Sudan "has been disturbed by environmental changes and uneven regional and sectoral development" (p247). Ecological changes in the marginal semi-arid regions that disturb the normal sequence of mobility transition include environmental degradation resulting from drought, desertification and resource over-utilization.

The ecological impacts of migrant farmers can have both positive and negative outcomes: for example, Pelzer (1968) found that Javanese wet-rice migrant farmers transformed in a short span of time the swidden areas of Sumatra by developing terraces and an irrigation system capable of supporting densities between four to five hundred persons per km²; but Cebuano migrants to Mindanao in the Philippines had denuded the vegetation and soils of their areas of settlement. On the local level, climatic and soil factors constrain the intensification of agricultural systems (Malcolm 1953, Kurji 1983, Pingali 1990). The labour requirements and soil responsiveness to labour inputs and fertilizers are generally determined by locations and land types on the local catena or toposequence. The soils at the top of the catena are lightest and easiest to cultivate but have the least moisture and nutrient content. The soils of the drainage areas and depressions at the bottom of the catena have the highest moisture and nutrient content but are the heaviest and most difficult to cultivate. In semi-arid areas and under low population density, the upper parts of the catena are cultivated first and there is a movement down the catena in response to increasing population density. But this sequence may be reversed, especially in areas where moisture is reliably found only in the lower parts of the catena and if the crop preferences, for example the cultivation of rice, dictate cultivation to be initiated first in the lower parts of the local catena.

Other integrating schemes that emphasize the evolutionary-ecological nexus have been suggested, for example Miller (1965) considered migration as a part of the evolutionary process of adaptive radiation of hominids and humans, and Norgaard (1984) has suggested a model of coevolutionary agricultural development. How ecological change affects the mobility transition within and of the peasant economy remains little understood.

2.5 Population Growth, Migration, and Agroecological Development: A Theoretical Model

Nurun Nabi and Krishnan (1993) have suggested that the construction of typologies and theories of specific types and suited to particular migration situations are a useful approach to understanding migration. In this present study of rural migration in Serengeti district, a very simple model of the relationship between population growth, migration and agroecological impact/change can be advanced as a guiding framework for the analysis of the patterns, causes, processes, and consequences of migration involving agriculturalist households.

The model comprises three main interrelated conceptual dimensions: demographic, environmental, and agroecological. The demographic dimension assumes an increasing population which means a growing size at the household level. The environmental dimension posits that the agroecological practices of migrant households are adaptive or maladaptive in the destination. The agroecological dimension focuses on the agroecological practices: migrant farmers may either replicate the farming practices of their areas of origin in their places of destination, they may imitate the practices of the farmers of their host community, they may innovate new farming practices, adopt transformative practices, or a combination of these strategies. Innovative practices here mean practices not used earlier and arise out of 'trial and error'. Transformative practices consist of new innovations, for example new crops and associated techniques of cultivation.

Agroecological practices are likely to be replicated when the areas of origin and destination are ecologically similar and thus involves little 'agroecological distance'.

Imitation is most likely when the migrant moves to a dissimilar area (agroecological distance is high) and where the host population has been in the destination area long enough to have established a viable agroecological system. Innovation is likely when the migrants are pioneers in very dissimilar environments as compared to their places of origin. Transformative practices may be the introductions of modern extension services, for example growing of cash and export crops (e.g. flowers in Arumeru district, Tanzania).

Given a growing household size, the outcomes are: (1) Malthusian dilemma, when the agroecological practices (whether replicated, imitated, innovative, transformative, or a combination thereof) are maladaptive and lead to a collapse of the household agroecological system (mortality and/or migration); (2) Geertzian (1963), when agricultural practices (replicative, imitative) are ecologically adaptive but result in agricultural involution; and (3) Boserupian (1965, 1981), when the agricultural practices (replicative, imitative, innovative, transformative or combination thereof) are adaptive and lead to improvements and transformations in agroecological carrying capacity. The following chapters will examine the interrelation between migration and agroecological dynamics in the Serengeti district. It is a part of the exploration of the impact of migration on agriculture urged by Mollett (1991), and White and Woods (1980).

Chapter Three

The Serengeti: Study Area, Environment, and Land Use

Changes in the size and distribution of a population do not occur in isolation but take place in the context of their environment. The ecological settings may influence the resource opportunities and constraints that shape trends in population size and distribution, settlement patterns and land use. Such demographic changes and their accompanying human activities in turn affect the local and regional environment. The types and degree of interlinkages between population, socioeconomic, and ecological processes, and their spatial and temporal variation, are also of importance in the specification of the research problem and in the choice of the study area.

This chapter first defines the study area in the Serengeti district and briefly describes its political and administrative framework. The study area forms the focus of the field research and was chosen to reflect the variation in the local and regional environment, and in the patterns of the movement of people, land use and rural development. Next, the Serengeti environment is described and its processes are examined in a larger spatial and structural framework of the ecological gradients of the Eastern Lake Victoria agroecological region (Malcolm 1953, Ford 1971, Kurji 1983). The gradients define the resource opportunities and constraints faced by humans, livestock, and wildlife in the region (Sinclair and Norton-Griffiths 1979). Finally, the major land uses are discussed. Agriculture and wildlife conservation are the dominant land uses. In particular, the large area set aside for conservation and the biological richness of Serengeti have important implications for continued human population growth, rural migration, settlement and agricultural development in the Serengeti district.

The regional environment and land use are characterised by pronounced spatial heterogeneity and temporal variability. Thus, demographic and agroecological processes, for example population redistribution and agricultural intensification, and their linkages to environmental heterogeneity need to be examined on the local and regional scales in space, and on the short-term as well as the evolutionary scale over time (Sinclair 1979a).

Such perspectives are analytically and practically important for formulating appropriate rural development and wildlife conservation policies, especially because of the competing demands of agricultural activity and wildlife protection. The integration of land uses and effective coordination of public policy poses special challenges. Several levels of government and administration are involved in planning and implementing public policy. Such agencies have to promote rural development and wildlife conservation under severe constraints in the availability of financial, scientific and technical, and managerial resources.

3.1 The Study Area in the Serengeti District, Tanzania.

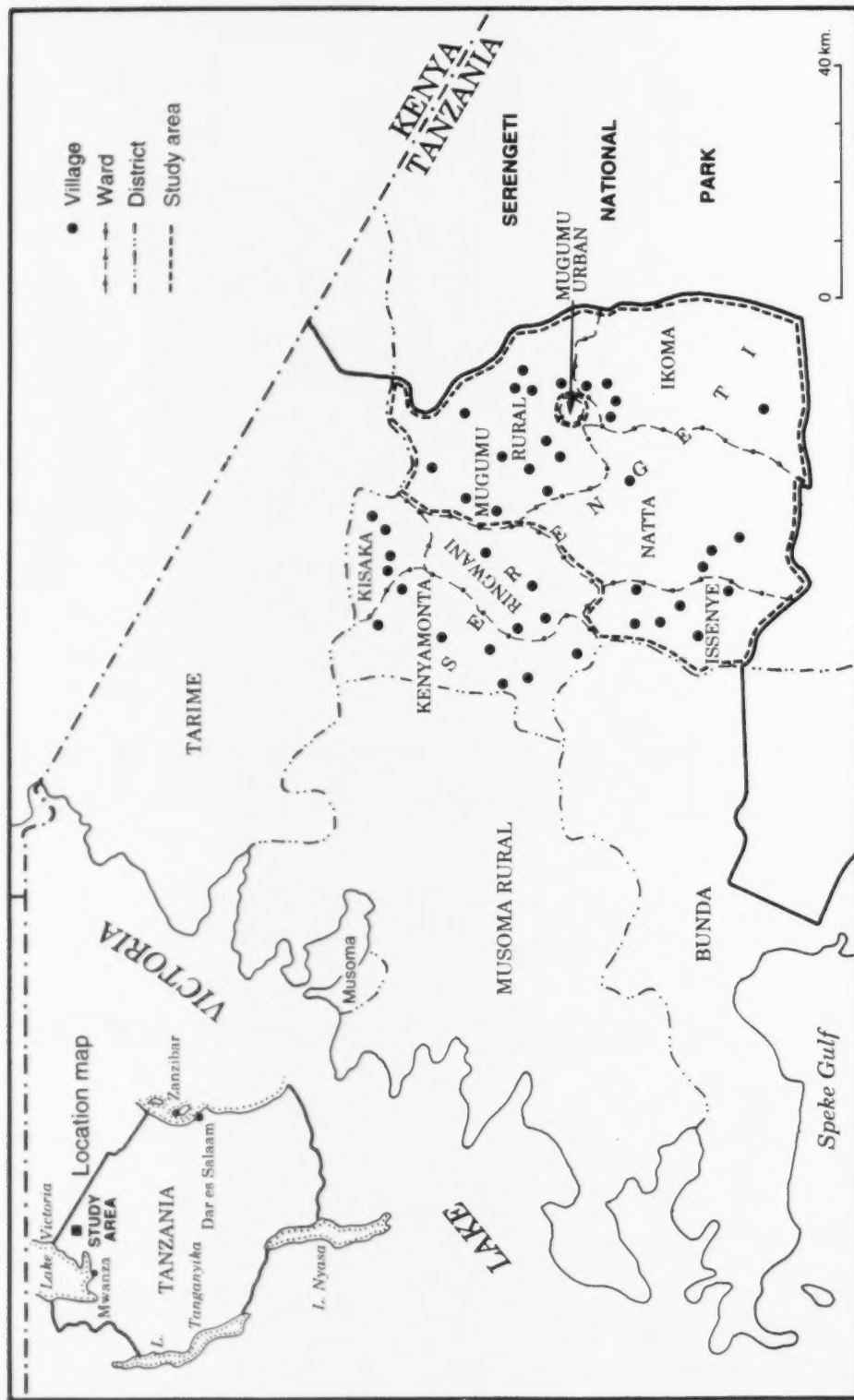
3.1.1 Geographic Boundaries

The study area is located in the Serengeti district, northern Tanzania. The district is geographically defined by the latitudes 1° 30' - 2° 33' south, and longitudes 34° 30' - 35° 15' East (Figure 3.1). Serengeti district has an area of about 11,776 km², and forms one of Tanzania's smaller administrative districts. It accounts for about 1.34% of the land area of mainland Tanzania. The total population of the district in 1988 was 113,121 persons; about 0.5% of the total mainland Tanzania population (Bureau of Statistics 1989, 1992). The Serengeti district is divided into 8 census and administrative wards. In 1988, there were 54 villages and one urban settlement, Mugumu town (Bureau of Statistics 1989). The field study (see chapter 4 on methodology and data) focuses on a sample of 173 households in 18 villages in 4 rural wards (Mugumu rural, Natta, Issenye, and Ikoma).

3.1.2 Political and Administrative Framework

The political and administrative framework in Tanzania is also the organizational basis of the national census and is used for the purposes of publishing population and other data. The framework is also often used in carrying out demographic, social, economic, and other types of surveys by government agencies and also by researchers. In Tanzania, there currently are 25 administrative regions: 5 on the islands of Zanzibar and Pemba; and, 20 on the mainland of the country (Bureau of Statistics 1989). The

Figure 3.1 The Serengeti District and Study Area, Tanzania



Serengeti district forms the southeastern portion of the Mara administrative region in north-central Tanzania. The other districts of the Mara region are Tarime, Musoma Rural, Musoma Urban, and Bunda. Musoma town in the Musoma Urban district is the regional administrative headquarter (Figure 3.1).

The Serengeti district was formed in 1973 through a partition of the Musoma Rural district and originally included the area of the current Bunda district (Figure 3.1). By the time of the 1988 census, two separate districts, Bunda and Serengeti, were created. Three wards, Kisaka, Ringwani, and Kenyamonta, that were a part of the Musoma Rural district in 1978 were instead added to the jurisdiction of the Serengeti district.

The district has its own administrative system and the headquarter is at Mugumu town. Serengeti district comprises eight wards, each with its villages. Every ward has an administrative secretary (*katibu kata*) and each village has its own government comprised of a village council, chairman and secretary. Within the village council, there usually are a varying number of specialised committees dealing with issues such as development, security, land and resources, social issues, etc. The members of the village council and its chairman are elected by the village community, usually for a period of 5 years.

The village community is also organised for political and administrative purposes. Households are divided into cells, usually 10 to each cell, and there is a cell leader (*balози*) and an assistant cell leader. The administrative and political hierarchy links and operates from within villages through its government, via the ward secretary, and eventually to the district and regional administrations, and the national government. The field surveys of a sample of villages and households for this study were also organised and carried out through the above local political and administrative structures.

In addition, Tanzania National Parks (TANAPA) is a parastatal authority that has a specific administrative jurisdiction over a large part of the Serengeti district. About 64.3% of the Serengeti district area lies within the Serengeti National Park that has been set aside, since 1951 (National Parks Ordinance 1951), for the protection of the wildlife and their habitats. Serengeti is the largest and oldest of Tanzania's 12 national parks. Each national park has its own administrative organization under the authority of

TANAPA and is responsible for protecting wildlife from poaching, and the habitats from illegal burning and felling of vegetation, agricultural activity, the introduction of exotic plant and animal species, and the unauthorised removal of species from the national park. TANAPA also constructs roads and facilitates a tourist industry based on wildlife. Ecological research is carried out by the Serengeti Wildlife Research Institute (SWRI).

The rest of the district area has no restrictions on agricultural activity and settlements. Game hunting is allowed under licence in the Grumeti and Ikorongo Game Controlled Areas (GCA) set up originally as a buffer between the national park and the agricultural lands. Since their establishment in 1959 (Fauna Conservation Order 1959), more than a half of this buffer area has become settled by cultivators and livestock herders. The district headquarter of Mugumu lies in the originally defined Ikorongo GCA and had a density of 412 persons per km² in 1988 as compared to 25.1 persons per km² in the rest of the district. Officers of the Game Division administer the GCA from within the district and regional administrations. TANAPA, SWRI and the Game Division are a part of the Ministry of Natural Resources, Tourism and Environment of Tanzania.

3.2.1 The Serengeti Environment and Ecology

The Serengeti environment is characterised by a diversity of landforms, habitats, and land uses. More is known about the wildlife and their habitats than about the people and land in the rest of the region due to over 30 years of intensive research in wildlife ecology (Huxley 1965). Some of this work is listed in Sinclair and Norton-Griffiths (1979), and in Kurji (1984). The dynamics of the wildlife ecosystem have been synthesized by Sinclair and Norton-Griffiths (1979), while McNaughton (1985) has described the ecology of the grasslands-herbivore system, and Maddock (1979) has outlined the seasonal patterns of distribution and movement of the 'migratory' populations of game in the region. Research has also focused on the palaeontology and palaeoecology of the region, including hominid and human evolution (Leakey 1965, Bower 1973, Leakey et al. 1979). This research began in the early part of this century and has also contributed to knowledge on geology.

The area of settlement and agricultural activity in the Serengeti district has received relatively less attention in research. The earliest written descriptions on the people, habitats, land use and wildlife were provided by Kollmann (1899) and White (1915). The competing needs for land between agriculturalists and wildlife also became a focus of research as human populations and settlements expanded, especially since the mid-1930's. Some settlements were evacuated in the process of creating the Serengeti National Park (Grant 1954), and the boundaries of the wildlife sanctuaries redefined to protect wildlife as well as to resolve conflict between the wildlife and pastoralists for resources such as pastures and water (Pearsall 1957). Tanner (1965) carried out sample surveys to examine population changes and their effect on land use in the Musoma district between 1955-1959. One of the aims of this study was to assess the competition for land between agriculturalists and wildlife. The Musoma District then included Serengeti, Musoma Rural, Musoma Urban, and Bunda districts as well (Figure 3.1). Anacleiti (1977) has discussed the people, environment, and pastoralism in the Serengeti district and Christianson and Tobisson (1989) have considered recent environmental degradation and socio-political conflict in the area.

The trends in the populations and land use of the Serengeti district are not isolated from developments in the adjacent districts (Figure 5.1). Kurji (1978) adopted a wider, eastern Lake Victoria regional framework and used 1957 and 1967 census data to analyse the changes in the population size and distribution at the district and divisional levels. The people, habitats, settlement, and agriculture of the Shinyanga and Mwanza regions to the south and southwest of Serengeti district are discussed in several studies, particularly Malcolm (1953), Ford (1971), Rapp (1976), LZP (1980), Ecosystems (1982) and Bantje (1989b, 1991). This area is inhabited mainly by the WaSukuma people and has generally been referred to in the literature as a part of "Sukumaland". Many WaSukuma have in-migrated into the Serengeti district (Tanner 1965, Kurji 1985a). Maganga (1987) and Bantje (1989a) have compiled annotated bibliographies of work on environmental problems, and on agriculture and land use, Kurji (1985a, 1985b) described the population and land use changes based on census data and aerial photo analyses, and Bantje (1989b, 1991), Collinson (1972), Ford (1971), and Malcolm (1953) examined the

environment and agriculture. Tobisson (1986) instead focused on the dynamics of the family among the WaKuria peoples living in the Tarime district to the north. This work is also of relevance to the WaKuria who live in the Serengeti district.

Sinclair (1979a) has emphasized two types of variability in the Serengeti environment and ecology: (i) the spatial heterogeneity in geology, climate, soils, and vegetation; and, (ii), the variation on the temporal scale, that shapes the evolutionary history of the wildlife ecosystem and the life history strategies that organisms have evolved to accommodate the spatial and temporal variability. The 'migration' of the wildebeest and zebra of the Serengeti represents an example of a life history strategy that has evolved over the past two million years to cope with environmental variation. Their nomadic movements in search of pasture, water, and nutrients (Kreulen 1975) range through an area of about 30,000 km² and include the Serengeti National Park, the plains of the Ngorongoro Conservation Area, the Maswa Game Reserve, portions of the Grumeti and Ikorongo Game Controlled Areas in Tanzania, and the Masai-Mara National Reserve in Kenya. This seasonal range is defined as the Serengeti ecosystem (Watson 1967, Pennycuik 1975, Maddock 1979).

Environmental variation also affects the activities and life history strategies of people living outside the game sanctuaries (Malcolm 1953, Ford 1971, Lang 1978, Anacleti 1977, Tobisson 1986, Koponen 1988). The Serengeti environment is predominantly savanna and Harris (1980:7-9) has observed that "an appreciation of the diversity of savanna environments is a necessary prelude to the discussions of their human ecology". Cultivators and pastoralists have had to adapt to the limitations imposed by constantly changing environmental conditions in their use of available resources for survival.

An important research issue is that of identifying the relationships between specific environmental factors and their role in shaping ecological variation. Harris (1980:9) has suggested that precipitation, runoff, temperature, altitude, slope, drainage, soil, and fire are the main "abiotic elements that shape savanna environments and contribute to their diversity". McNaughton (1983:314), after intensive monitoring of the grassland-herbivore system of the Serengeti, observed that "Geology, topography, and climate are primary environmental factors that establish the context within which soil formation, ecosystem

development, and the evolution of grazing-web members are defined and constrained. Recognizing that is necessary and informative".

However, abiotic factors are not the only elements influencing ecosystem development and the evolution of life history strategies of organisms in the Serengeti region. The endemic animal life of the Serengeti environment is also very rich in diversity (Sinclair 1979a). There are about 30 species of ungulates forming a population over 2.5 million in size, 13 species of large carnivores, and more than 400 species of birds. The wildlife, especially the large mammals, play an important role in shaping the regional environment. For example, browsing and grazing by elephants has thinned out the hillside bush thickets of the northern Serengeti and made it possible for fires to convert most of the thickets to more open wooded grassland which has, in turn, increased the range available to other grazers, for example wildebeest and zebra (Norton-Griffiths 1979). The ecological impact on vegetation of elephants and wildebeest in particular appear to condition the availability of grazing resources for other herbivores in the area (Sinclair 1979a).

Humans, through agriculture, hunting, the use of fire, environmental protection, park management, tourism, economic development, introduction and control of diseases, etc., also have affected the ecology of Serengeti's wildlife in different ways (Norton-Griffiths 1979). For example, the growth of human population and expansion of settlements since the 1930's has reduced and constrained the earlier range of the wildlife populations. Elephants used to trek into the Lake Masarori swamps about 60 km west of the current Serengeti National Park boundary (White 1915) but are now restricted within the national park. Since the early 1960's, the control of rinderpest among cattle benefitted the wildebeest population which increased more than four times by the mid-1970's (Sinclair 1979c) although settlements have also constrained their western range (Pennycuick 1975). In the last 20 years, poaching has almost made the rhino population locally extinct but the control of fires has improved woodland regeneration and facilitated the increase of browsers like giraffe and impala.

The biotic and abiotic elements of both the wildlife and agricultural ecosystems are thus structurally and processually linked in a dynamic entity termed as the Eastern Lake

Victoria agroecological system (Kurji 1983, 1985a, 1985b). It spans from the eastern shores of Lake Victoria to the Gregory Rift Valley (Figure 5.2). Some of the complex interactions between the people, livestock and wildlife of the region since the early 1890's are discussed by Ford (1971), Kjekshus (1977), Sinclair and Norton-Griffiths (1979), Kurji (1983), and lead to the conclusion that the characteristics of environmental heterogeneity and the life history strategies evolved by organisms, including human migrations, determine the type, strength, and extent of interactions between people, livestock, and wildlife. These characteristics and strategies will dictate in the future, as they have done so in the past, how the agroecological system may respond to natural or human-induced disturbances in the area. Thus, rural development and ecological conservation need to be planned and managed on the scale of the agroecological system rather than the current approaches based on sectoral and administrative criteria such as tourism, agriculture, administrative regions, districts, national park, game reserve, etc., (Kurji 1983).

The environmental heterogeneity in the Serengeti has been attributed to the superimposition of a variable rainfall regime upon a basic plan of spatial differences in the geology and physiography (McNaughton 1979). The resultant ecological variation in habitat types and the use of the diverse habitats is a key factor affecting the demography of human, livestock and wildlife populations. The processes of competition and facilitation within and between the different populations are crucial mechanisms mediating the dynamic interactions that allow resource partitioning while maintaining very high species and pattern diversity in space and over time (Sinclair 1979a).

3.2.2 Geology

The geology forms one of the foundations of the Serengeti environment. It is a mixture of formations of various ages and rock composition that owe their origin to several orogenic episodes (Atlas of Tanganyika 1956, Atlas of Tanzania 1967, Geological Map 1st Edition, Quarter Degree Sheet 24, 1967; Macfarlane 1969, Temple 1971). The eastern section of the Serengeti district consists mainly of an Archaean shield of granites, gneissose and migmatite. It may be over 3 billion years in age and among the oldest

rocks on Earth (Temple 1971). A narrow lens of this formation extends west along the south of the Mara river towards Ngorimi and locally underlies the area between Bwitengi and Ikoma (Figure 5.2). The shield also reappears west of the district and to the shores of Lake Victoria.

The shield is ingrained with vestiges of folded Nyanzian and Kavirondian formations (Temple 1971). Granitic intrusions are visible as inselbergs or kopjes rising above the rest of the nearly level topography (Macfarlane 1969, Hay 1976). They form relatively resistant structures and have a distinct vegetation from the surrounding woodlands and grasslands (Belsky 1989). The Nyanzian formations within the Serengeti district can be found mainly in the Ngorimi, Ikoma-Mangwesi, and the Kilimafedha-Banagi areas. The major rock types are banded ironstones consisting of quartzite with dark magnetitic or chloritic bands. The younger, Kavirondian system is found in the hills between the Grumeti and Mbalangeti rivers and typically comprises of grits, mudstones, and conglomerates usually surrounded by and integrated with Nyanzian rocks. Gold is often associated with granitic intrusions and has been mined at Nygoti and Kilimafedha in the Serengeti district as well as in Musoma Rural, and Tarime districts. The mining has usually stimulated in-migration (Tanner 1965).

The Bukoban-Mozambiquan system, between 1100-600 million years old, is found in the Ikorongo hills and across the Simuji tributary of the Mara river. It lies under the Musabi plains but is exposed in the Nyaraswiga, Kimarishe, and Nyamuma hills within the Serengeti National Park (Atlas of Tanzania, 1967). The metamorphic rocks usually consist of gneisses, some graphitic schists and quartzites, sandstones, siltstones, mudstones and shales. The various hills jut above similar aged formations overlain by much younger alluvium and colluvium. Most of the southern section of the Serengeti district has sedimentary and metamorphic deposits of Cainozoic times, for example in the drainage of the Mbalangeti and Grumeti rivers and the plains of Musabi, Sibora, Ruwana, and Ndabaka. These sediments of alluvium and colluvium include sands, gravel, silt, mud, lacustrine sands, limestone, and tuffs. They were laid down, most likely, as former beds of Lake Victoria and overlie Nyanzian, Bukoban, Kavirondian, and granitic shield formations.

Several shallow lakes and basins were formed by the warping of the surface that accompanied rift-faulting movements (Temple 1971). Lake Victoria is the largest of such basins. The Lake Eyasi trough is of Cretaceous age, about 135 million years old, while the Gregory rift originates from Tertiary times, about 70 million years ago. Both these rifts were rejuvenated by the Plio-Pleistocene earth movements to define their present horst and graben characteristics. The rifting processes were also accompanied by extensive orogenic activity that resulted in the Ngorongoro and Kilimanjaro volcanic massifs and large accumulations of basic, alkaline and intermediate lavas. The Ngorongoro highlands has dormant volcanoes ranging in age from 3.7 million years to the still active Oldonyo Lengai. The Tarime highlands, the hilly area of Mugumu (1500-2000 m) in the Serengeti district, and the escarpments of Issuria and the Mara valley owe their origin mainly to the effects of orogenic and rifting activity further east.

Several local geological structures are also important. Pleistocene lake beds at Olduvai and Laetoli have yielded hominid and other plant and animal fossils in a matrix of volcanic tuffs and ashes from the volcanoes of the nearby Ngorongoro massif. Some of these emissions were carried by winds and deposited in areas further west, for example in the Mbalangeti drainage. Much of the underlying geology of the southeastern plains of Serengeti and western Ngorongoro is covered by volcanics of Tertiary and Recent times. The basement is most likely of the Granitic shield and Mozambiquan systems.

3.2.3 Relief and Drainage

The general relief of the Serengeti district and Eastern Lake Victoria basin, as everywhere else, has been shaped by the processes of orogenesis, erosion, deposition, folding, and faulting. The underlying geology has been an important controlling factor influencing the regional and local physiography which has, in turn, had an important influence on the land use. Cotton cultivation, for example, is restricted to the more level slopes of areas closer to Lake Victoria and below 1500 m in altitude while the introduction of coffee as a cash crop is being focused in the wetter, more sharply undulating landscapes above 1500 m of the north eastern part of the Serengeti district.

Most of the district and regional relief is a gently undulating plateau that is tilted upwards from the shores of Lake Victoria in the west, to the highlands of Tarime in the north and the Ngorongoro massif in the east. The altitude rises from approximately 1,100 m at the lake shores to over 3,000 m in the Ngorongoro highlands. The regional relief can be divided into the upland lakeshore (< 1200 m in altitude), the upland plateau (1200-1500 m), the higher land, hilly zone between 1500-2000 m above sea level, the Ngorongoro massif (>2000 m) with several volcanic cones (e.g. Ngorongoro, Empakaai), and the Gregory rift graben occupied by Lakes Natron-Eyasi-Kitangiri. The change in altitude is most pronounced along the walls of the Rift Valley and slopes of the volcanic cones.

In the Serengeti district, several hills rise above the local, level to gently rolling topography dissected by the drainage system. Most of the hills are less than 350 m above the surrounding land. Much of the drainage is shallow and there are wide plains composed of alluvial-colluvial deposits between the hill slopes. The catena (Milne 1935) is an important feature of the local topography but it is absent or much subdued on the more extensive alluvium-colluvium and volcanic ash covered plains of the Serengeti.

The regional drainage consists of two main catchments. The catchment basin of Lake Victoria has an approximate area of 36,600 km² and its main rivers are the Mara, Ruwana-Grumeti, Mbalangeti, and Duma-Simiyu. The Serengeti district is drained by the Mara, Ruwana-Grumeti and Mbalangeti, and their tributaries (Figure 5.2). The Lake Eyasi-Kitangiri catchment has an area of about 64,800 km². The Sibiti, Semu and Sanga are some of the main rivers of this system and these flow generally from the north towards the south and southeast. Lake Eyasi is alkaline/saline while Lake Kitangiri is almost fresh water. Total water discharge is much larger in the Lake Victoria catchment because it drains the wetter parts, semi-arid to dry-subhumid, of the agroecological region (Norton-Griffiths et al. 1975). In contrast, much of the Eyasi-Kitangiri catchment comprises of the arid/semi-arid areas in the rainshadow of the Ngorongoro Highlands and its total discharge is much less than that into Lake Victoria (Tanzania National Atlas 1967).

The larger rivers and lakes form important local and regional ecological gradients that particularly affect the seasonal movements of the wildlife and livestock. Water availability, especially in the dry season, is often confined to the pools in the deeper sections of the rivers and in the lakes. Its availability is an important factor in Tanzania's agriculture and development (Gillman 1936) and its presence is largely dependent on the local and regional climatic regime (Jackson 1971).

3.2.4 Climate and Rainfall

The climate of the Serengeti district and Eastern Lake Victoria region is highly variable, mainly due to the differences in the amount of mean annual rainfall, and the length of the annual dry period (Morgan 1972). Diurnal differences in temperature are more pronounced than seasonal changes and its variations are greater in the higher altitudes of the Ngorongoro highlands as compared to those on the shores of Lake Victoria (Jackson 1971). Evapo-transpiration and rainfall, rather than temperature and amount of sunlight, limit plant growth.

Airmasses from the Indian Ocean are the main source of rainfall in the East African region, including the Serengeti (Jackson 1971, Norton-Griffiths et al. 1975). The convergence of airmasses, uplift and adiabatic cooling cause rainfall. In the Ngorongoro, airmass convergence and uplift forced by the highlands precipitate rainfall, especially on the south-easterly slopes exposed to moisture-bearing winds from the Indian Ocean. The climate on these slopes is closer to sub-humid and supports evergreen montane forests. Rainfall decreases dramatically as the winds cross westward over the highlands and portions of the Serengeti Plains in the lee of the volcanic massif. The climate here is arid to semi-arid, and mean annual rainfall is between 500-700 mm with a generally severe dry season from July to October (Norton-Griffiths et al. 1975). The coefficient of variation in mean annual rainfall in the area is about 80% as compared to less than 25% on the southeastern slopes of the highlands. Evapo-transpiration on the rain shadowed plains is accelerated by dry season winds from the the surrounding highlands.

The climate of the central parts of the Serengeti National Park and the Serengeti district gradually changes from semi-arid to dry-subhumid. The higher land, hilly zone

in the north of the Serengeti district is mainly semi-arid, with a mean annual rainfall average between 800-1000 mm. Farther north and into the Tarime highlands, the climate becomes dry sub-humid with an annual rainfall average between 1,100 - 1,500 mm; here the coefficient of variation in mean annual rainfall is about 25%. There is greater opportunity in this area to get two crop harvests in the annual agricultural cycle. Areas closer to Lake Victoria also get some rainfall from a smaller, semi-permanent system of low pressure airmasses that converge in the Lake Victoria region (Jackson 1971, Norton-Griffiths et al. 1975). The mean annual rainfall increases as one moves from the shores of Lake Victoria in the west, through the valleys and upland plateau of the Serengeti district, and towards the higher, hilly portions in the north. There is no indication of cyclicity in the temporal pattern of rainfall (Pennycuick and Norton-Griffiths 1976).

The rainy season is between November and May; the short rains (**vuli**) occur in November and December, and the long rains (**masika**) fall in March and April. There is a noticeable dry period in between the two rain periods, especially in the lower altitudes closer to the shores of Lake Victoria. The dry season (**kiangazi**) extends between June and October. It is sometimes punctuated by intense thunderstorms that locally make water and pasture available. The wildlife, and the agriculturalists are quick to use these critical resources during a period otherwise with severely limited food and water supplies (McNaughton 1979). Mortality is most pronounced among livestock and wildlife in the long, dry season. The dry season rainfall also dictates whether an area can support more than one harvest in a year. Within the Serengeti district, only a single harvest of food crops and cotton is usually possible in the upland lakeshores and upland plateau. But in the higher, hilly zone two harvests of food crops can be made in a year.

Water availability is both a vital life resource and an environmental hazard. Agriculturalists depend on adequate and reliable rainfall for crop cultivation, animal husbandry, and water sources for domestic use. Gillman (1936) concluded that water supply was the dominant factor determining the human occupation of land while soil fertility and topography were of secondary importance. Rainfall and permanent water sources also affect the health of people because they provide habitats for disease vectors to proliferate. Mosquitoes transmit malaria and Bancroftian filariasis, and snails are the

intermediate hosts in the development of bilharzia (Page 1971). Unprotected water sources also become contaminated with surface runoff during the rains, resulting in water-borne diseases just when water becomes more widely available. The risk of diseases becomes much higher in the more densely settled lakeshore areas where the temperature and permanent presence of water provide breeding grounds for its vectors and hosts. Often, people and livestock also spread diseases through their patterns of water-use, sanitation and movements.

3.2.5 The Soils and Catenas

The soils of the region are the products of three main factors: the parent materials derived from local lithological units; the overhead climate; and, the local topographic profile. These natural factors generally condition the soil characteristics and determine their agricultural value. Climate, especially rainfall, seems to have a more permanent influence on agricultural production than soil nutrient deficiencies that can be improved with fertilizers. In some areas of long term cultivation, for example the Ukara island, naturally poor granitic soils have been made more fertile through manuring and mulching. The growth of population induced agricultural intensification capable of supporting population densities over 300 persons per km² (Rounce 1949, von Rothenham 1968).

Malcolm (1953) considers the *catena* (Milne 1935) as fundamental to the classification of the soils, their vegetation, and cropping properties. He defines the catena as "the sequence of soil types following topographic levels" (Malcolm 1953:4), i.e. "the natural arrangement of soils from the top to the bottom of the slope, the sequence of gradations usually being repeated in the reverse order on the opposite rise" (Malcolm 1953:174). The local soil catenary sequence is an important controlling factor in the pattern of grazing and browsing activities of livestock and wildlife (Vesey-Fitzgerald 1960, Bell 1971, Banyikwa 1976, McNaughton 1979). The amount of effort involved in working soils increases down the catena slope as the soil clay content increases and soils become heavier.

A common catena from the region can generally be sub-divided into five sections (Malcolm 1953). At the top are granite hills with friable gritty loams with some plant debris or a ridge-top of sandy soil. Below the rocks and on a moderate slope lies a broad zone of brown sandy soil which grades into the third zone of leached, pale-coloured fine sandy soils on a gently sloping area of the catena. The fourth section has a very gentle gradient and comprises grey sandy 'hardpan' or 'cemented' soils which may occupy a wide zone in the larger valleys. This zone may be prone to sheet erosion. The valley bottom or *mbuga* is the lowest part of the local catena and has heavy, grey to black clays. The *mbuga* is generally a zone of soil deposition; most of the *mbuga* soils tend to have deep cracks during the dry season when they become desiccated.

The soils of the Serengeti district can be divided, according to their maturity, into four main types (Atlas of Tanzania 1967) of catenary associations depending on variations in climate, parent materials, topography, and geology. The catenas on granites and gneisses are the most common soil topo-sequences. Soils derived from metamorphic rocks also have a catena similar to the sequence on granites. The catena on lacustrine marls have a calcareous chocolate or dark grey loam with lime nodules. Catenas are most pronounced on granitic parent materials of the Mugumu area but are generally subdued on lacustrine marls between the Grumeti and Mbalangeti rivers (Figure 5.2).

The soil associations in the eastern portion of the Serengeti district, e.g. Mugumu Rural and Urban wards, consist of reddish-brown, ferruginous soils on acidic, crystalline rocks and are derived from granites, banded ironstone and acid gneisses; vertisols in valleys and flat areas are derived from fine textured riverine and lacustrine alluvium/colluvium; and halomorphic solonetz from recent lacustrine sediments. The central portion of the Mara river valley has vertisols in topographic depressions, and the area lying between the major hill blocks has vertisols with solonetz. In the Ikorongo and Ngorimi areas, the soil catenas are comprised of ferruginous soils on granites, ferrisols from Bukoban-Mozambiquan sandstones, sandy Cretaceous and Jurassic sediments, and sandy colluvium. The Grumeti and Mbalangeti river valleys to the south have localized lenses of reddish brown soils on gneisses, some ferruginous soils on sandy parent materials, and mineral hydromorphic soils and vertisols or solonetz in topographic

depressions. The hydromorphic soils are derived from alluvial/colluvial materials and are generally found on the lower slopes and in the depressions.

The agricultural value of the soils of the Serengeti district varies but is generally poor (Atlas of Tanganyika 1957, Atlas of Tanzania 1967). The sandy loam to clay loam soils derived from granites, quartzites, gneisses, and sandstones generally have weak structure, poor water retention and nutrient content, and are often prone to erosion. These soils can be used, in areas of adequate rainfall, to grow sorghum, maize, groundnuts, cassava, yams, cotton, tobacco and for pastures. The sandy to clay loams and clays of flat areas and topographic depressions have poor drainage and are heavy to hoe and ox-plough but can be used for growing rice, beans, cotton, sorghum, cassava, pawpaws, bananas, sugar cane and vegetables. These soils are very sticky when wet and hard when dry. The use of camber beds improves crop yields but the use of irrigation causes salinization.

The ethnosciences of local farmers on soils, vegetation and water availability is of growing usefulness for land use planning and agricultural development (Malcolm 1953, Lang 1978, Collinson 1972). This indigenous knowledge could provide the foundations of improvements in agriculture through farming systems and on-farm research. Extension activity based on indigenously familiar soil science would be more effective and easier to carry out. It would complement the more restricted, conventional approach of crop development and productivity improvement by trials in an experimental station, for example at Ukiruguru in Mwanza district. The improvement of agricultural production and conservation of natural resources in the Serengeti district has become more urgent given the conditions of environmental degradation, socio-political conflict, and increased pressure on farm lands, food, water and woodland resources (Christiansson and Tobisson 1989).

Malcolm (1953) mapped and described the soils of "Sukumaland" while noting their common crops, cultivation practices, flora and water availability. He also clarified and summarized the nomenclature used by the WaSukuma for the variety of hills and rocks, and soils found in their region. The Wasukuma recognize 29 soil types in 6 major soil groups and identify the natural vegetation and most promising crops associated with each soil type. The ethnosciences of the inhabitants of the Serengeti district remains largely

unresearched but also offers considerable potential for information on soil and topographic associations useful for agricultural extension and ecological conservation.

The WaKuria of the Mugumu rural ward of Serengeti district recognize five broad sections in the local catena (Figure 3.2). Their names are phonetically spelled and represent a preliminary effort towards establishing the KiKuria nomenclature of land form and soil types. These sections are: egikeregat (ridgetop), agatiro (upper slope), kingarare (middle slope), hano hikae (lower slope), and iribate (valley/drainage). The Kuria also recognize the following five main soil types: irimwamu (sandy), egesense (loamy), iritiribe (clay), iriberetu or rosana (red clay), and irigogwe (laterite).

3.2.6 The Vegetation

The vegetation of the Serengeti is characterised by a great diversity of species and high pattern diversity. The major vegetation types are grasslands, woodlands, and forests (Herlocker 1976) which can be further sub-divided into community types, and then into discrete communities (Schmidt 1975, McNaughton 1983). Belsky (1989) has defined 'landscapes' as mosaics of discrete vegetation patches with different sizes, compositions, shapes and longevities and described them on a continuum of spatial-temporal scales ranging from a few meters to several hundreds of square kilometers in size, and from a few years to tens of thousands of years in age.

Within the Serengeti National Park, pure grasslands are found on the Serengeti Plains and on some of the lacustrine marls of former beds of Lake Victoria. The *Acacia-Commiphora* type is found over the upland plateau in the western and central portion of the park area. Some of the river valleys, for example the Mara and Duma-Simiyu, have patches of riverine forest. The inhabited areas of Serengeti district also had landscapes similar to those in the park but they have been modified by crop farming, livestock grazing, and burning. Much of the vegetation in the uncultivated areas consists of degraded bushlands and many waterholes are surrounded by denudation caused by overgrazing of livestock, mainly cattle and goats (Belsky 1989).

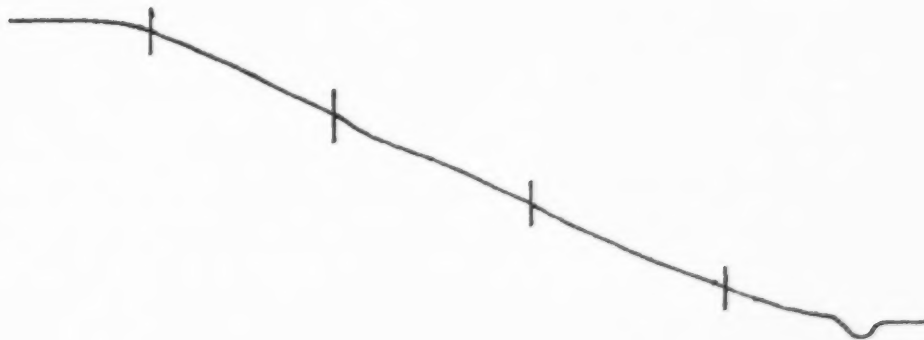
Figure 3.2 A Generalised Serengeti Catena: Structure and Local Nomenclature

Catena Feature:

Ridgetop	Upper Slope	Middle Slope	Lower Slope	Drainage
Egikeregat	Agatiro	Kingarare	Hano hikae	Iribate

Soil Type:

Sandy	Sandy Loam	Loam	Loamy Clay	Clay
Irimwamu	Egesense			Iritribe



Local names of catena features and soil types are in KiKuria

The vegetation and landscapes of the wildlife habitats of the Serengeti are patterned mainly by natural processes, especially moisture availability for plant growth, the impact of low rainfall on soil weathering, and the impacts of wildlife and fire that alter the structure of plant communities (Belsky 1989). Studies indicate that since the 1960's, large mammals such as elephants, and fire have transformed the denser woodlands of the Serengeti into less continuous patches of wooded grasslands, successional bushlands, and remnants of the original woodland. Such changes may be part of an oscillation in a continuous 'woodland to grassland back to woodland' cycle of unknown duration but linked to variations in grazer density, animal impacts, fire intensity and rainfall (Belsky 1989, Norton-Griffiths 1979).

Settlement development and human activities outside the national park, for example crop production, hunting, the use of fire to clear land, and the introduction and control of diseases such as rinderpest, may also be contributing factors involved in the switch in the vegetational cycle. Sinclair (1979) observed that wildebeest population size and grazer density since the 1890's have been mainly controlled by rinderpest introduced into the wildebeest via cattle. The control of rinderpest in the 1960's and the subsequent increase in wildebeest has in turn increased the grazing pressure on the grasslands and reduced potential fuel for dry season fires. The reduction and restriction of elephant range has imposed greater browsing impacts on some mature woodlands which have subsequently been thinned out (Norton-Griffiths 1979). Since the 1980's, the elephant population of the Serengeti has declined because of poaching but the impacts of this reduction on vegetation change have yet to be systematically analysed.

The impacts of human and wildlife activities need not always be considered as ecologically destructive. Instead, they may be viewed as perturbations in ecosystem dynamics and as disruptive influences (Norton-Griffiths 1979). These impacts may even be essential for maintaining vegetation diversity which supports the game populations. McNaughton (1979) demonstrated a reduction in productivity and diversity of grasslands protected from the effects of grazing and burning. However, overgrazing and frequent burning are deleterious to the vegetation and soils of a mainly semiarid region. This risk is especially high in the settled areas where population pressures and sedentary cultivation

do not allow an adequate period of recovery from the effects of repeated cropping, burning and grazing. Christiansson and Tobisson (1989) suggest that socio-political conflict between the clans and tribes competing for increasingly scarce land, pastures, water, and woodland resources has contributed to recent environmental degradation in the Serengeti district. In addition, periodic droughts have also contributed to the stress in resource availability but their role in population growth and redistribution remains unassessed.

A special and important factor in the man-vegetation-wildlife-landuse relationship is the presence of the tsetse fly. In the 1920's, epidemics of sleeping sickness killed many people and forced others to abandon their settlements and croplands, and move further west towards Lake Victoria (Ford 1971). After the 1930's, the expansion of human populations and livestock led to the reduction of tsetse infested habitats through the burning, felling and clearing of bushlands. Croplands were once again brought back into agricultural production as people migrated back into the land previously abandoned. The bushlands and some wooded grasslands of the wildlife sanctuaries remain the most important habitats for tsetse fly and a potential source for trypanosomiasis (Geigy et al. 1971, 1973; Geigy and Kauffmann 1973). This threat of the disease cannot be eliminated without killing off the wildlife and stripping a large amount of the vegetation of the area. Instead, sleeping sickness affecting humans and cattle will have to be controlled medically through inoculations and treatment. Before the advent of the modern medical approaches to control and treat sleeping sickness, the peoples of the region kept tsetse infestation in check by felling and burning vegetation and hunting the local wildlife. Cattle were also deliberately exposed for brief periods to tsetse bites to build some immune resistance to sleeping sickness (Ford 1971). Kjekshus (1977) describes this technique in the local ethnosience as a form of 'environmental prophylaxis' to trypanosomiasis.

3.3. The Land Use in the Eastern Lake Victoria Agroecological Region

Land use in the Serengeti district and the eastern Lake Victoria region can be sub-divided into two contrasting ecosystems for analytical purposes. These are the agricultural or 'cultivation steppe' (Malcolm 1953), and the 'wildlife' ecosystems. In Tanzania, wildlife conservation is the second largest land use after subsistence agriculture (Sabuni and Kurji 1991). The area set aside for wildlife protection in the Eastern Lake Victoria region is the primary factor determining the amount of land available for settlement and agricultural development in the future. The Serengeti and Ngorongoro are world renowned wildlife conservation areas with archaeological sites that have yielded unique hominid fossils.

3.3.1 The Agricultural Ecosystem

The 'cultivation steppe' of eastern Lake Victoria forms one of Tanzania's largest concentrations of humans, livestock and agricultural activity. The area has more than one tenth of the national population of about 27 million people, about a sixth of the country's domestic stock, and the main cotton producing zone. Cotton exports are the second most important source, after coffee, of Tanzania's foreign exchange earnings. In addition, the region has significant food crop production, fishing, forestry and mining, and tourism based on the Serengeti and Ngorongoro wildlife sanctuaries (Tanzania National Atlas 1967).

The agricultural ecosystem lies mainly in the western half of the Eastern Lake Victoria region. It extends from the eastern shores of the lake to the western boundaries of the Serengeti National Park and the Maswa Game Reserve and is sub-divided into two by the extension, to within 8 km of the lakeshores of Victoria, of the 'western corridor' of the Serengeti National Park. The present study focuses on a part of the north-eastern portion of the agricultural ecosystem (Figure 5.2).

There are marked and important differences in the environment, land use and cropping practices in the agricultural ecosystem. These differences mainly reflect the variations in rainfall, topography and soils. For example, human density is higher in

areas of relatively lower rainfall closer to the shores of Lake Victoria but the largest herds of livestock are kept in areas of lower human densities closer to the boundaries of the wildlife reserves (Raikes 1981). Two main cropping systems can be distinguished. While food crops like sorghum, millets, maize, sweet yams and cassava are grown throughout the settled areas, cotton is grown only in the upland lakeshores and upland plateau below 1500 m in altitude. Rice is also grown, mainly in the upland lakeshore. No cotton is grown as a cash crop in the hilly, highland zone above 1500 m. There is, instead, more emphasis on growing maize as a cash crop, and on keeping cattle. Attempts are being made to introduce the production of coffee as a cash crop.

The agriculture of the region is mainly extensive but some intensification in land management is apparent in the most densely settled lakeshores and islands of Lake Victoria (Rounce 1949a, 1949b; Malcolm 1953, von Rotenham 1966). Intensive agriculture is induced by population growth and by non-demographic factors such as the development of markets and transportation systems. In Ukara island, intensification may have also been forced by its geographic isolation (Koponen 1988, Gourou 1964).

3.3.2 The Wildlife Ecosystem

The second major group of habitats forms the wildlife ecosystem of the Eastern Lake Victoria region. The ecosystem is relatively less transformed by human activities than in the agricultural areas. The development of conservation as a land use in eastern Lake Victoria is shown in Figure 3.3. The forests of the Ngorongoro highlands were declared a reserve by the German colonial administration while the Serengeti developed an international reputation for big game hunting. Soon concern for the survival of wildlife increased and, in the early 1920's, the British administration established closed reserves to restrict entry, hunting and photography except under licence. The partial reserves protected only specific species, e.g. lion, from being hunted. Later, the establishment of game reserves prohibited settlement and agriculture in the reserved area and hunting could only be carried out under licence.

The Serengeti National Park was gazetted in 1951 to fully protect the wildlife and their habitats and it then extended into the Ngorongoro highlands. However, in 1959 the

Figure 3.3 Spatial Expansion of Wildlife Conservation in the Eastern Lake
Victoria Region, Tanzania

Source: Compiled from Handbooks of Tanganyika; Tanzania National Atlas



-  Closed reserve
-  Partial reserve
-  Game Reserve
-  National Park
-  Multi-purpose conservation area
-  Game controlled area
-  No conservation status



Ngorongoro Conservation Area was created as a multi-purpose zone to allow its resident Masai pastoralists their traditional rights of domicile along with wildlife protection, forest preservation and tourism. More areas were subsequently designated as wildlife sanctuaries as ecological research identified important wildlife range and the prospects of tourism as a source of income increased. The Serengeti National Park and the Maswa Game Reserve now form the ecological core area for the wildlife conservation effort and together they have a size of about 17,600 km². The national park has a buffer of game controlled areas: Ikorongo and Grumeti River Game Controlled Areas, on the northwestern boundaries, and the Dutwa Game Controlled Area to the southwest (Figure 3.3). However, these game controlled areas have been areas of continued human immigration, settlement and agricultural activity and their value as a buffer between core wildlife habitats and intensive agriculture is much reduced. Hunting within the buffers is only allowed with a licence but this requirement is largely ignored and poaching is widespread. A notable feature of the wildlife ecosystem is the seasonal 'migration' of about 1.6 million wildebeest and nearly 200,000 zebra in search of pastures, water, and nutrients (Grizmek and Grizmek 1960, Pennycuick 1975, McNaughton 1979, Sinclair 1979c). These nomadic movements track rainstorms and involve circulation between dry season habitats in the Masaai Mara Game Reserve in Kenya and northern Serengeti, and wet season habitats in the plains of Serengeti-Ngorongoro in the southeast portion of the region. The 'western corridor' is used as a passageway in the movement from the dry and wet season habitats. There are also other large populations of game, for example buffalo, topi, and many predators that reside permanently in the different habitats; their ranges are local, rather than ecosystem-wide. Often, the seasonal range of the wildlife extends into areas of settlement and agriculture outside the national park and game reserve.

The goal of ecological management in the conservation areas appears to aim at maintaining the highest levels of species and pattern diversity, including minimization of human impact on and interference in ecological processes and reducing geographic and genetic isolation of the wildlife sanctuaries. Exponents of Biogeographic Equilibrium theory postulate that geographic and genetic isolation results in species extinctions (May

1975, Diamond 1981) and view the development of settlement around the boundaries of Serengeti's wildlife sanctuaries as the principal cause of their growing geographic and genetic isolation. Soule et al. (1979) predict that the Serengeti will lose 50% of its large mammals (about 15 ungulate species) in the first 250 years of ecological isolation while Western and Sessemakula (1981) estimate a loss of one specie. The reduction by settlements and agriculture of habitats suitable for game is regarded as a more insidious and greater threat to the survival of wildlife than hunting and poaching (Eckholm 1978).

There is some geographic and ecological overlap in the spatial definition of the agricultural and wildlife ecosystems: for example, the wildlife range extends across habitats that include significant amounts of settlements and crop farming in the Ikoma area, the Ruwana and Dutwa plains (Kurji 1985a, 1985b). Such overlap results in competition, as well as facilitation, for biophysical resources with consequences for the various populations. The wildlife is often killed by poachers, especially outside the national park. Grazing by wildlife may facilitate livestock by removing the coarser grass sward to make growing shoots more easily available. On the other hand, the wildlife destroys and damages growing crops, kills domestic stock, and sometimes injures or kills people. The management of such areas requires specialized planning and coordination between the various agencies responsible for rural development and ecological conservation.

The need to integrate the planning and management of habitats and land uses in the eastern Lake Victoria region has urgency because of two main reasons. First, the agricultural and wildlife areas have compelling national and international values. The region is one of Tanzania's main concentrations of people, livestock, agriculture and wildlife. Secondly, the agricultural and wildlife areas are structurally and dynamically linked in an extensive, agroecological system.

Some preliminary steps have been taken to promote more conceptual and spatial integration. Research on natural or anthropogenic disturbances provide a tool for understanding how ecosystems are structured and function (Kendall 1969, Jacobs 1975, Schreiber 1982, Belsky 1987), and to assess the role of environmental variation in the processes of ecosystem dynamics (Sinclair 1979a). Such work, in turn, provides a guide

for informed public policy. Conyers (1972) has outlined agro-economic zones defined by differences in the environment, land use, agricultural practices and human density in the eastern and southern region of Lake Victoria and Gerresheim (1972, 1974) has presented a landscape classification of the Serengeti which could be used for the collection, storage and analyses of ecological, agricultural, and other kinds of data. Mascarenhas and Kurji (1978) have examined the ecological and socio-economic implications of building, as proposed (JICA 1970), a railway through the Serengeti to link eastern Lake Victoria to the Tanzanian coast. Several sectoral and physical plans have considered integrated regional development (SIDA 1976, LZP 1980), while McCall (1980) and Brandstrom (1985) have reviewed the various efforts and problems in rural development including those involving the interactions of disease, drought, livestock and society (McCulloch et al. 1968).

Chapter Four

Data and Methodology

The issues of methodology and data have become a focus of increasing theoretical concern and practical work in migration research (Mahadevan and Krishnan 1993). Improvements in the availability and types of data on migration have contributed to conceptual advances which in turn have stimulated developments in the techniques, coverage and scope of data for migration studies. Among others, Kosiński (1975), and Nurun Nabi and Krishnan (1993) have discussed data and measures in migration research, and specialized reviews of migration research and methodology in developing countries are available in Todaro (1976), Simmons et al. (1977), Goldstein and Goldstein (1981), Bilsborrow et al. (1984).

Chang (1981:325) has emphasised the importance of collecting and using data that are "reliable, pertinent, and sufficiently representative for the study of migration behaviour". The methodology and data should address the demands of the theoretical model and hypotheses of the study, be gathered at the appropriate level, and the research instruments, for example surveys and questionnaires, ought to be designed, specified and implemented properly. In his view (Chang 1981:316), an ideal study of migration would involve a three-tier approach combining and integrating macro-level analysis using census and similar data, an intermediate or meso-level analysis based on large surveys with more detailed questionnaires, and a micro-level analysis combining survey and intensive observation techniques. Bilsborrow et al. (1984) also recommend a multilevel framework to investigate migration. But the integration of disparate theoretical models, different analytical scales and units, varying data sources and methodologies remains a major challenge in migration studies (Woods 1982, De Jong and Gardner 1981, Nurun Nabi and Krishnan 1993).

This chapter describes the methodology and data sources of the study of migration in rural Serengeti district. The chapter first outlines the census data used in the macro-level analysis of population growth and net migration in the villages, wards, divisions

and districts of the eastern Lake Victoria region of Tanzania, including the Serengeti district. In particular, it notes the types of migration data available from national censuses, and the changes in the boundaries of the various spatial units over time. It also presents the vital statistics method used to indirectly derive estimates of net migration for the various spatial units. It was not possible to use direct methods of measuring migration because the relevant census data on migration are only available for the regional and national levels. The second section of the chapter notes some problems of migration surveys as a data source and lists a few recommendations for migration researchers in survey design. The third section describes the sampling methodology, and the village and household level questionnaire surveys carried out to gather data on the patterns, causes, processes and consequences of migration on the micro-level. The final section presents the techniques used in the analysis of the village and household level data. Most of the analysis has relied on cross-tabulations, analysis of variance, and multivariate regression modelling.

4.1 Migration Data and Studies in Tanzania

The most important sources of data for the study of migration are censuses, surveys, and population registers (Kosiński 1975, Goldstein and Goldstein 1981, Nurun Nabi and Krishnan 1993). Some countries have attempted, for example Indonesia's Sample Vital Registration Project (1977-1979), to measure migration through a 'dual-record system' which combined a registration system on births, deaths, and migrations with a retrospective sample survey of a population of a sample area to estimate the rates of births, deaths, and migration during the preceeding year (Bilsborrow 1993). But registration systems in most countries usually focus on births and deaths, and the sample migration rates derived from registration may be too under-estimated to be of much use in assessing the overall rates of migration in a country.

While Tanzania has a good record of collecting population data, the issue of migration has not been adequately examined in population studies in the country (Mascarenhas 1989). The effects of fertility and mortality have dominated population debate, analysis and public policy; yet, some of the most wide ranging policy impacts

have been on the distributional characteristics of the national population, for example from 'villagization' in 1973-74. Tanzania, like most developing countries in the world, has no population registration system to help monitor internal mobility and migrations because of the large costs, manpower requirements and administrative effort involved in operating a registration system. Attempts have been made to operate village-level registration of births, deaths and movements but with little success. However, data on border crossings resulting from international movements are routinely collected.

A growing number of surveys have gathered data to study migration, especially to urban centres (Hirst 1971, Sabot 1979) and in the context of national development (Collier et al. 1987, Mascarenhas 1989). Rural based surveys of population movements have mainly dealt with the migration of labour for mining and cash crop production (Gulliver 1959a, Sago 1974, Uchendu 1975), those associated with development programmes such as the provision of water supplies and irrigation (Berry 1972) and settlement schemes (Mascarenhas 1970), and because of population growth and resource needs (Hall 1945, Tanner 1963, Tomikawa 1970, Bantje 1989). Before the 1960's, studies of rural population distribution and movements were based predominantly on survey data. Since then, macro-level analysis of inter-regional migration and urbanization have become the focus of study, stimulated in part by the availability of data from censuses and the concern for national development planning. Rural studies based on surveys have also been continued and are increasing in number.

Population censuses are the major source of migration data and the main basis of much of the analysis of migration in Tanzania. Mascarenhas (1989) compiled an annotated bibliography of studies on migration and Mlay (1975) noted that the major types of census data are on ethnicity, age and sex, and birth place. Both direct methods, for example inter-regional migrations based on place of birth data, and indirect techniques, for example the vital statistics and survival methods, have been applied to the study of population movements in the country. The procedures, coverage and types of questions asked in the censuses and in the methods used to analyse the results have varied, broadly depending on whether the census was carried out before or after independence in 1961.

4.1.1 Censuses and Migration Data in Colonial Tanzania

There are no population data available for the pre-colonial period in Tanzania except those which can be garnered from the descriptive accounts of explorers and travellers on population distribution and land use. However, these sources have become an important asset in studies of historical demography (Ford 1971, Koponen 1988). Population counts instituted by the German colonial administration in various parts of Tanganyika territory in early 20th century provide a beginning in quantitative demographic studies. A territorial population count was first carried out in 1913 and estimated a population of about 4 million persons. The estimate was derived by multiplying the number of adult tax payers with an average number of dependents per taxpayer. Archives in Germany of its colonial administration in Tanganyika may have, as yet unexploited, demographic data and information for the period.

Head counts were continued by the British authorities in 1921, 1931 and 1934 (Gillman 1936, Martin 1961a) and the estimates of population size were derived from enumerations in selected, 'typical' villages, and poll tax collections by administrative officers. Gillman (1936) compiled a map of population distribution in Tanganyika and Baker (1937) described the distribution of the African population of East Africa. The report of United Nations (1949) detailed population estimates of Tanganyika before 1948. Kuczynski (1949) reviewed the census methodology and data for the populations of the territories of East Africa and noted significant problems of reliability, gaps in coverage, and the limited scope of the demographic data compiled in the administrative routine.

In the post-WW II period, a more systematic approach to censuses was adopted and the first modern censuses were conducted in East Africa in 1948. These censuses covered Kenya, Uganda, Tanganyika, and Zanzibar. Other pre-independence censuses in the area of Tanzania included those conducted in Tanganyika in 1957 and in Zanzibar in 1958. The colonial administration often enumerated non-native populations in separate censuses (e.g. in Tanganyika in 1931, 1948, 1952, 1957), sample censuses of urban populations were undertaken for planning and administration, and demographic data were also collected in medical surveys (e.g. by East African Medical Survey and East African Institute of Malaria and Vector-borne Diseases), and in sociological, anthropological, and

economic studies. Martin (1949; 1961a) has described the methods and enumeration in the 1948 and 1957/1958 series of *de jure* censuses, and Prothero (1961) has reported on population maps and mapping in the region south of the Sahara, including Tanzania. Overall, there was a progressive improvement in the scope and coverage of the censuses over time.

Two main instruments were used in the enumerations to gather population data. The general questionnaire, targeted to all persons in all households, included questions on age, sex, and tribe or ethnicity. Porter used the 1957 general census data for territorial census units of Tanganyika, and from Ugandan and Kenyan censuses to compile a population distribution map for East Africa. A special questionnaire included questions about migration: in the 1948 population census of Tanganyika, a 10% sample of the population enumerated was queried about their place of birth; in the 1957 census of the African population, a 5% sample was asked about their place of birth. But no place of birth by residence tabulations were published for either census (Masser et al. 1975). The sampling fraction was reduced because of the costs of more intensive sampling in a large country with scattered populations.

The pre-independence censuses (prior to 1961) instead published populations for provinces and their total population born outside the province of enumeration to indicate net migration. The place of birth data were subordinated to information on tribal affiliations to infer the patterns of migration (Gulliver 1959b). Southall (1961) used 1948 census data to derive migration rates for some major tribes of East Africa, Hirst (1969, 1970, 1972) developed measures of mean migration distance for each tribal group and used indices of tribal mixing, and age-sex differentials in a principal components analysis to define net migration areas in Tanganyika. Migration analysis based on tribal data assumes that each tribe has a specific and distinct 'tribal area' and that a person enumerated away from the 'tribal area' is a migrant (Harvey 1971, 1972). But, definitions of 'tribes' and 'tribal areas' are far from consistent and accurate (Southall 1961, Koponen 1988, Masser et al. 1975); for example, the 1948 census distinguished 201 tribes but the census of 1957 noted only 127 tribes in mainland Tanzania (Martin 1961b).

The spatial resolution of the census tabulations was progressively improved. By 1961, there were 9 provinces and the number of districts had increased to 57 as political control, development, communications, and population size expanded. Urban areas of sufficient population size also became districts; the first was Dar es Salaam in 1937. Improvements in census coverage and methodology also took place as more educated enumerators became available and the level of literacy in the population increased (Martin 1961a).

4.1.2 Censuses and Migration Data in Independent Tanzania

In independent Tanzania, censuses were carried out in 1967, 1978 and 1988, and all enumerated the 'de facto' population. These censuses have covered both the mainland of Tanzania, and the islands of Zanzibar. The 1967 national census divided the country and published population size data for regions, districts, divisions and enumeration areas. The enumeration area was the smallest spatial unit used in censusing. Thomas (1967) has identified the changes in divisional boundaries for the 1957 and 1967 periods. The 1967 census included queries to assess population movements (Mlay 1975) and the question about the place of birth was targeted to all of the urban and a 20% sample of the rural population. These data provided the basis for the most extensive analysis, to date, of migration in Tanzania (Claeson and Egero 1972, 1973; Claeson 1974, Egero 1974a, 1974b). The published volumes included tabulations of place of birth by place of residence for each of the 67 district populations; the 'region' or country of birth was indicated for those born outside the locality of their residence during the census. There also were special tables for 5-yr age groups by "born in district" and elsewhere (Masser et al. 1975). Since then, the published census tabulations on migration have been produced only for the country and administrative regions, classified according to rural and urban areas. These tabulations thus emphasise the long-distance, inter-regional movements although most migration in the country is local and rural-based.

In the 1978 and 1988 censuses, the smallest censusing unit also was the enumeration area (EA). However, the sizes of enumeration areas and their use in the sample enumerations for migration data varied. In both the 1978 and 1988 censuses, an urban

EA was generally expected to have 300-500 persons; in the 1978 census, a rural EA on the Tanzanian mainland was expected to have 800-1600 persons and in 1988, 700-900 persons while a rural EA in Zanzibar during both censuses was expected to have 300-500 persons. These differences in turn resulted in varying sampling proportions, depending on the census period, and locations of enumeration areas (Mainland, Zanzibar; rural, urban). Olofsson (1983) has described the sampling for the 1978 census and noted that the average sampling fraction for the rural areas of mainland Tanzania was about 4%, for the urban areas it was about 4.7%, and for rural and urban Zanzibar it was 35% and 50%, respectively. The sampling fraction for rural Mara region, which included Serengeti district, was 5% and for the urban centres of Mara region, including Mugumu town in Serengeti district, it was about 99%.

Two types of questionnaires were used during each census (Bureau of Statistics, 1978; 1989). The general questionnaire was for all households and included questions about the name, age, sex, citizenship, and relationship to the head of the household. The detailed questionnaire was targetted to a sample of households and among its migration related questions were queries about the place of birth by region, place of residence during the previous census (i.e. 1967 and 1978 respectively), and place of residence in the year before the census (i.e. 1977 and 1987 respectively) by region and whether in a rural or urban area. Both censuses classified wards into three types: rural, urban, and mixed rural-urban in the peripheries of the larger urban centres of the country.

The 1978 and 1988 census tabulations have made age-sex structure data available at the national, regional, district, ward and village levels, and by rural or urban locations. Populations living in scattered homesteads outside villages, and mobile populations, for example nomadic pastoralists, within each ward were also identified. But the spatial resolution of the migration data tabulation was reduced. In contrast to the 1967 census, the published 1978 and 1988 census tabulations for place of birth by place of residence were available only for the country and regions, and according to rural or urban area (Bureau of Statistics 1978, 1989). Table 4.1 summarises some of the migration related questions asked, the spatial level of published place of residence by birth-place tabulations, and other features of the post-independence censuses.

Table 4.1 Some Migration Related Questions and Features of Post-Independence Censuses in Tanzania

Questions/Features	1967	1978	1988
Smallest Census Unit	EA	EA	EA
General Questionnaire Used?	Yes	Yes	Yes
Sample Questionnaire Used?	Yes	Yes	Yes
Place of Birth Question?	Yes	Yes	Yes
Place of Residence in Previous Census?	No	Yes	Yes
Place of Residence 1 Year Before Census?	No	Yes	Yes
Level of Migration Tabulation?	D	R	R
Separate Rural and Urban Data?	Yes	Yes	Yes

Note: EA=Enumeration Area, D=District, R=Region

Sources: 1967, 1978, 1988 Census Methodology reports and papers

Thus, direct methods of measuring migration can only be applied to the region level data and indirect, for example census survival and vital statistics methods, have to be used to estimate net migration at the sub-regional levels like districts, wards, and villages. The loss of spatial resolution in the tabulation of migration data has reduced the potential to use census data to understand local level movements and the impact of migration as a factor in demographic processes and development at the sub-regional spatial levels.

The analysis of migration from census data on place of birth, place of previous residence, length of present residence, and place of residence at a fixed prior date (United Nations 1970) also has a number of shortcomings: (i) it excludes multiple migrations made during the intercensal period and the movements made by return migrants; (ii) the volumes and directions of migration flows cannot be identified; (iii) the causes and specific sources of origin of in-migrants cannot be known; (iv) the timing and distances moved by migrants and their demographic and socioeconomic characteristics

cannot be ascertained (Gosal and Krishan 1975); and, (v) people may also have problems knowing and remembering the place of birth, previous residence, and the length of present residence in a location. Claeson and Egero (1973) note that there may also be confusion among respondents about the definition of term 'locality' of birth or residence as is enquired in the Tanzanian censuses.

In addition, there are some methodological and analytical problems in migration studies. Generally, the volume of migration detected is inversely related to the size of the spatial unit for which population data are available: more migration is measured for smaller spatial units (Kosiński 1975). When the interrelation between migration and other factors is examined, correlation coefficients and other standardised measures tend to become larger as the sizes of aggregation units increase (Blalock 1993). Hence the effects of the size and shapes, changes in the boundaries of spatial units used for recording population data, and aggregation effects in analysing data at various spatial levels need to be understood in studies of migration.

4.1.3 The Changes in Administrative and Census Framework

Changes in the boundaries of census units need to be taken into account in analysing trends in population size, growth rates, demographic structure, and migration (Kosiński 1975). The evolution of the political and administrative system from colonial times and the redistribution of population have resulted in important changes in the types, number, size, and boundaries of administrative and censusing units in Tanzania. Sutton (1971), Dattoo and Sheriff (1971), Kjekshus (1977), Iliffe (1979) and Koponen (1988) discussed the political and administrative structures of pre-colonial societies that need to be taken into account in the study of historical demography. The German administrative system until 1918 has been described by Mascarenhas (1971); Thomas (1971a) traced the evolution of the overall administrative framework during British rule between 1919-1961; and the political geography and post-independence administration are examined by Cliffe (1971) and Thomas (1971b), respectively.

German administration had divided the country into 12 civilian and 16 military districts and the colonial governor was seated in Dar es Salaam (Mascarenhas 1971).

Then, the district in eastern Lake Victoria included almost all of present-day Mara and Mwanza regions. The district headquarter was at Mwanza town, and the sub-district headquarter was at Musoma town. A minor administrative post was established at Shirati (in present-day Tarime district) and a fort was built at Ikoma in the Serengeti district. Archives in Germany of its colonial administration may have useful demographic information for the Tarime and Serengeti districts.

After Germany's defeat in World War I, Tanganyika came under British administration which modified the organization imposed by the Germans and incorporated the traditional African structures of political and administrative control in a policy of 'indirect rule' (Thomas 1971). In 1925, the British grouped the districts into 11 provinces defined on the basis of geographical features and tribal distribution. Each province was the responsibility of a Provincial Commissioner, and each district had a district administrative officer. In the 1925-31 period, districts were reformed with the aim of placing the various units of a tribe under one chief and in a single administrative district. But this approach was not always successful because traditional African forms of organization involved large 'language-production' societies with linguistic and cultural affinity and within which production, exchange and reciprocal relations were carried out (Koponen 1988). As a result, colonial administrative boundaries often cut across ethnic entities.

During British rule, collection of population data became a part of the administrative functions. District and chiefdom population estimates were based on tax and sample family size counts. By 1933, the German administrative district was sub-divided into Musoma, Maswa, and Mwanza districts; each district had its own headquarter and within the district there were several chiefdoms. Then, the Musoma district's southern boundary traversed southeast from the mouth of the Suguti river, across the northern edge of Speke Gulf, to the rise of the Mbalangeti river, and to its meeting point on the eastern boundary on the Ngare Nyanyuki river. At the time of the first territorial census in 1948, the Musoma district had been sub-divided into North Mara and Musoma districts along the Mara river. A census of the African people of the territory was conducted in 1957 and the lowest spatial level of data tabulation on population size was the territorial census unit

(TCU). These units were largely similar to the earlier chiefdoms.

The post-independence administrative framework comprises of a hierarchy of authorities responsible for government, planning, and development. The most important sub-national units are the region (*mkoa*); and, the district (*wilaya*). This structure involves many modifications of the political and administrative system organized during German and British rule. Provinces were renamed as 'regions' and in 1963, the nine mainland regions were sub-divided into 17 regions. The regional and district authorities are responsible for general administration, co-ordinating the provision of government services, and development in their areas. There now are 25 regions: 20 of them are on the mainland of Tanzania (formerly Tanganyika), and the islands of Zanzibar and Pemba are sub-divided into 5 regions. Each region has a Regional Administration that is the major arm of the national government. Each region consists of a variable number of districts, usually depending on its population and spatial size. This framework is also the basis for population censuses and it determines the spatial level at which demographic data are usually available.

The district forms the basic administrative and political unit in the country and has been the most enduring unit since colonial times (Cliffe 1971). Local government, political party organization, and parliamentary constituencies are also based on districts. The district is also the spatial unit for which most of the demographic data from national censuses and surveys is tabulated and analysed. As populations have expanded and administration extended to cover their distribution, new districts have been generally derived by sub-dividing older units. The Serengeti district owed its creation to such sub-division.

The Serengeti district was established in 1973 and originally included the area now in Bunda district (Figure 3.1). By the time of the 1988 census, it had been further sub-divided into the Serengeti and Bunda districts. Three wards, (Kisaka, Kenyamonta and Ringwani) from Musoma district in the 1978 census were added to form the Serengeti district and some ward boundaries were changed in the inter-censal period. The Serengeti district now is bordered to the northwest and north by the Tarime district, the Musoma Rural district to the west, the Bunda and Magu districts to the southwest, the Bariadi

district to the south, and the Ngorongoro district to the east. Each of the districts has a head-quarter where the district level government is located. The northeastern boundary forms the Tanzania-Kenya frontier across which lies the Narok district of Kenya. The Serengeti, Tarime, Musoma Rural, Musoma Urban, and Bunda districts belong to the Mara region of Tanzania. The Magu district lies in the Mwanza region, the Bariadi district is a part of the Shinyanga region, and the Ngorongoro district lies in the Arusha region. District authorities are subordinate to the Regional authorities in the administrative and political hierarchy.

Districts are further divided into divisions (*tarafa*), wards (*kata*), and the villages (*vijiji*) form the smallest unit of the local level of government and administrative authority. A major innovation has been the institution of local government at the village level and the right of a village to legally incorporate itself under the Village Act of 1975. During 'villagization' in 1973-74, about 9 million people living in scattered homesteads in Tanzania moved into consolidated village settlements, especially in areas of low population densities. Village local governments have included several specialised committees dealing, for example, with development, land and resources, security, etc. Households within villages are grouped into 'cells' for the purposes of political party activities, to enable representation in the local government, and to organize household participation in community activities such as building and maintaining schools, clinics, public buildings, etc. The household cell system has also been used for planning and executing censuses, especially the sample enumerations. Intra-village settlement patterns have also been changing: for example, since 1978 in Serengeti district, most of the homesteads lined along roads during 'villagization' have dispersed and are now scattered within village boundaries.

4.1.4 Indirect Approaches to Assessing Net Migration at Sub-Regional Levels

Since Tanzanian census data do not provide much information about migration at the sub-regional levels of the district, ward and village, indirect approaches have been used to estimate trends in migration. Three main methods, often referred to as 'residual'

methods, have been defined in the indirect approach: (i) vital statistics method; (ii) survival ratio method; and (iii) national growth rate method (Kosiński 1975). Each of these methods can be applied only to census units with the same boundaries over censuses; any changes in boundaries have to be adjusted for before estimates of migration can be made.

The vital statistics method estimates apparent net migration by comparing population sizes for two consecutive censuses and the changes due to natural increase. Local or national data on the natural increase (births - deaths) can be used. The survival ratio method requires data on the age-sex from two censuses and depends on the changes in the sizes of an age-sex cohort between two censuses to estimate net migration for age-sex groups and the total population. Survival ratios can be obtained from life tables (life table survival ratio method) or from two consecutive censuses (census survival ratio method). Data on place of birth or last residence can also be used to derive survival ratios and derive estimates of net migration. The national growth rate method calculates net migration by attributing the difference in population growth rate in an area as compared to the average growth rate for the country to migration.

However, these indirect approaches of analysing migration have a number of important general and specific problems (Masser et al. 1975, Martin 1961b, Kosiński 1975, Nurun Nabi and Krishnan 1993, Bogue et al. 1982). None of the methods includes multiple movements made between censuses or distinguishes the timing of movements and the different types of migrations (primary, return, etc). Neither do they identify the specific migration flows, the source areas, and the causes of movements. The age data used in the census survival methods of estimating net migration are affected by age mistatements, and the under-enumeration of infants and the aged in particular. The variations in population age-sex structures are affected by differential fertility and mortality rates as well as migration. There is also a lack of reliable fertility and mortality data to derive accurate survivorship ratios, especially for smaller spatial units, e.g. sub-region units like districts, wards, and villages.

4.1.5 Calculation of Population Growth and Net Migration Growth Rates

Estimates of net migration based on the vital statistics method are useful when data available for assessing the volume and flows of migrations between places are not available (Conway and Srestha 1987). The estimated net migration rates can also be used as the dependent variable in an analysis of its determinants, for example through multiple regression modelling (Bogue et al. 1982). In this study, the annual population growth rate and net migration growth rate for each of the different spatial units of Serengeti district (Appendix I) were calculated as follows:

$$\% \text{ Population Growth (per year)} = 100(\text{AntiLn} (\text{Ln} (1988\text{Pop}/1978\text{Pop})/10))-1);$$

where 1988Pop= Population in 1988, 1978Pop= Population in 1978, Ln=natural log, AntiLn=anti log, and the intercensal interval=10 years. For example, Mugumu Town had a population of 4042 persons in 1978 and 6758 persons in 1988. Therefore, $\text{Ln } 6758/4042=0.5139$, $\text{Ln } (6758/4042)/10=0.05139$, $\text{Anti-Ln } (0.05139)=1.0527$, and population growth = $100 (1.0527-1)= 5.274\%$ per year or 5.3% per year.

The Net Migration Growth Rate (NMGR) per year (Bogue et al. 1982) was calculated based on the following formula:

$$\% \text{NMGR} = 100(1988\text{Pop} - 1988\text{Popest})/1978\text{Pop},$$

$$\text{and, } 1988\text{Popest} = 1978\text{Pop}(\text{AntiLn}(t(\ln 1.028)));$$

where 1988Popest= the estimated population in 1988 based on an assumed Rate of Natural Increase (RNI)=2.8% per year. For example, the 1988Popest for Mugumu town = $4042(\text{AntiLn}(10 (\text{Ln}1.028))) = 4042(\text{AntiLn}(10(0.0276)) = 4042(\text{AntiLn}(0.2761)) = 4042(1.3180) = 5327.5$ or 5328 persons since there can not be 0.5 person; therefore $\text{NMGR} = 100 (6758-5328)/4042 = 35.37\%$ per decade. Thus, Mugumu town had a net in-migration rate of 3.54% per year between 1878-1988 in addition to a rate of natural increase of 2.8% per annum assumed to be due to the difference in the birth and death rates.

The Rate of Natural Increase (RNI) per annum was assumed at 2.8% because data on the district and the intra-district variations in birth and death rates were not available.

Instead, the estimated national rate of population growth for mainland Tanzania for the 1978-1988 period was adopted (Bureau of Statistics 1989). Population growth in Mara region, which includes Serengeti district, has almost equalled the national average rate of growth during the past two decades. But intra-regional differences in birth and death rates, and life expectancy are often quite significant (Egero and Henin 1973). The census survival ratio method was not used because a reliable district or sub-district level life table was unavailable. Tanzania does not have a comprehensive and reliable birth and death registration system as yet and thus, life tables appropriate to the local, sub-district demographic conditions have not been derived.

An additional methodological problem arises because the vital statistics method provides estimates of net migration growth rates that are highly and positively correlated to the rate of population growth in an area. However, the demographic processes involved in the two measures are not the same; the first measure refers to migration and the second includes fertility, mortality and migration. Each of the measures may be substituted for the other in a regression model, and the use of the two measures together results in multi-collinearity. DaVanzo (1981:124) also contends that there is no person that can be called a "net migrant" and thus net migration rates are unsuited to testing micro-level migration models; often the denominator of a net migration rate is incorrectly defined (it should include all persons at risk of moving, that is the total populations of origin and destination); and when analyzing net migration rates, "the effects of explanatory variables, or in- and out-migration cannot be allowed to be asymmetric".

Despite the above criticisms, the estimates of net migration were useful for gauging the overall pattern and level of migration impact on the inter-censal population changes in the villages and wards of the Serengeti district. These data are useful to government and other agencies in planning and policy-making on population, rural development and ecological conservation. The estimates of net migration were also used in identifying wards and villages in which surveys for a micro-level study of the patterns, processes and impacts of migration could be conducted.

Tanzanian censuses, like most censuses, do not query about the causes of migration or its decision-making processes. Thus, a sample survey of households was used to

examine the incidence and causes of migration, the patterns and types of movements and the distances moved, and some of the demographic and socio-economic characteristics of migrants in the Serengeti district. Movements of people take place in the context of the ecological, demographic, social, economic and political features of the communities in which they were resident or are going to inhabit. The contextual data were collected from village-level surveys and by querying migrants about their living conditions in the areas of origin. Census data were also used to determine the demographic and socio-economic characteristics of the places of origin and destination of migrants.

4.2 Meso- and Micro- Level Studies of Migration With Survey Data

Hugo (1981) noted that macro-level data on the demographic characteristics, the socio-economic features and the activities of people cannot be used to understand migration (and non-migration) decision-making processes partly because of the size, scale and diversity of topics covered in censuses and large population surveys. He conceptualized eight types of situations or stages in the migration process and identified three types of strategies to research migration processes and decision-making. These strategies depend on surveys as the major source of migration data, and are supplemented with information from participant observation and a small number of intensive case studies. Todaro (1976) noted that a combination of survey and census data was the most promising avenue for policy-oriented studies of migration. Mahadevan et al. (1992) discuss successful interviewing and data collection in demographic research.

4.2.1 Processes of Migration and Strategies to Research Migration

The eight situations or stages in Hugo's (1981) example of rural to urban migration are: (i) persons who have not thought of moving to the urban centres, (ii) rural persons who have thought of but rejected a move, (iii) persons with an intention to move but have not as yet departed, (iv) persons in the actual process of moving from rural to urban locations, (v) persons who have relocated from rural to urban places permanently and have no intentions to return to their rural places of origin, (vi) persons from a rural area

currently resident in an urban centre who intend to return to rural residences, (vii) persons in the process of actual relocation from the urban to the rural destinations from which they had earlier migrated, and (vii) return migrants from urban locations. The framework can be readily applied to rural-based movements.

Among the three strategies to research migration, the prospective approach examines the passage of an individual through each of the above eight stages in the processes of migration decision making. But the logistics of tracking individuals in each of these migration stages is very costly in time and money. The number of persons moving may also be under-estimated in a survey that follows persons who are moving (DaVanzo 1981). Thus, only a few studies have used the approach and mainly in the developed countries, for example Bach and Smith (1977); in developing countries Chapman (1975) has applied prospective analysis to mobility in two Guadalcanal communities, and Garbett (1975) repeated a survey of circulation movements in Zimbabwe.

The second research strategy focuses on the study of different individuals of similar backgrounds but at each of the different stages of the migration process. There is considerable variation in the studies that have used the approach, including the "tracer" and "matching" types of methods. For example, Caldwell (1969) first surveyed rural locations in Ghana and then conducted follow-up studies in the main urban destinations of rural to urban migrants, and Conway and Srestha (1987) surveyed in-migrants in the tarai (lowlands) of Nepal and then surveyed the hill areas where the migrants had originated. However, these studies covered both the places of origin and destination of random samples of migrants but not of persons of exactly the same backgrounds in both the locations of origin and destination.

Weisner (1973, 1976) attempted to maintain more strict comparability by asking in-migrants into Nairobi (Kenya) to match themselves with persons of the same subclan, similar levels of education and age in their rural places of origin. The rural persons so identified were then surveyed as well. Other studies, for example, Browning and Feindt (1969) on in-migrants to Monterrey (Mexico), and Paydarfar (1974) on in-migrants to the city of Shiraz (Iran) used survey data on migrants in urban locations and compared their characteristics with information from censuses on people in the rural areas of

origin.

Some major advantages of "tracer" type studies are the potential for participation observation as migrant individuals pass through the various migration stages, and the ability to interview persons in the actual stage of migration, thus not having to depend upon retrospective or recollected information or to ask people of their future migration plans. But the approach based on a study of individuals of similar backgrounds is difficult to implement since it involves interviewing migrant persons at several locations. In addition, individuals may not be of exactly similar backgrounds but inevitably differ in their characteristics, in the absolute time contexts of their entry in the different stages and hence, in the types of influences on the processes of migration decision making (Hugo 1981).

The third research strategy to study migration is based on a migrant's recollection and reconstitution of the migration experience. Generally, a migrant is interviewed in the destination and also asked to provide information on the conditions and motivations in the places of origin and enroute. Such an approach is perhaps the easiest to implement on a sample of migrants who can be readily identified in the destinations. Life cycle and residence history matrix approaches can be combined in a life-history analysis to note population movements and their associated causes and contexts (Goldstein and Goldstein 1981, Willigan 1993). Single or multiple surveys may be undertaken to investigate the causes, decision making, processes of moving and the consequences of migration.

But, retrospective or recollected migration information may be flawed: migrants may fail to accurately recall the circumstances, motivations and processes of decision making associated with migration and/or rationalize *post hoc* the causes, circumstances and processes of moving. Som (1973) has reviewed ways to detect and correct recall lapse errors, and Krishnan (1979) suggested a rotation sampling approach to rectify recall errors. But the problems of 'non-response' and correcting for it in demographic enquiries remain little researched (Mahadevan and Krishnan 1992). Equally important, studies that focus on the "destination-end" of migration ignore those who had not moved at all, those who circulate between places, and return migrants. Such studies usually emphasize the impact of migration, for example, on the urban pole of the rural-urban movement, while

the impacts on the rural origins and intervening areas are examined superficially, if at all (Findley 1977, Hugo 1981).

Brown and Sanders (1981) have emphasised that the patterns, determinants, processes and consequences of migration need to be examined in the context of the development level or stage in the area where the migration study is carried out. They have attributed the apparent ambiguities in the findings of earlier studies on internal migration, for example as reviewed in Todaro (1976), Connell et al. (1976), Findley (1977), Simmons et al. (1977), etc., to a failure to recognize that such studies were carried out in areas with different conditions or stages of development. Hence, the inability to reconcile research results from different areas and draw valid theoretical generalizations. Findley (1987) also emphasised the importance of examining the structural context of micro-level processes of migration.

According to Brown and Sanders "it is critical to control for or take into account the level of development" and "give explicit attention to the development variable" in studies of internal migration (Brown and Sanders 1981:183). This could be accomplished by (i) "a cross-sectional analysis of internal migration for countries at different stages of development" and (ii) "a cross-sectional analysis of internal migration among regions, towns, or villages within the same country, each representing different stages or different conditions of development". Either or both census and survey data could be used to test for the effects of the development level on migration.

The definition of development and the measurement of the levels of development has problems. Some approaches to measure development include the gross national product (GNP), the Gini coefficient of income disparities, and/or multivariate indices of development. Berry (1960), Soja (1975), Gould (1970), Joseph and Kurji (1982) use a multi-variate, factor analytic approach to derive indices of national and intra-national development, Chenery and Syrquin (1975) measured development in terms of overall well-being, and Yapa (1980) constructed the physical quality of life index focusing on the distribution of basic needs. Oppong and Ironside (1987) combined objective and subjective measures to evaluate quality of life in northern Alberta, Canada. More recently, life expectancy at birth has become widely used as a measure of development

and the World Bank has derived a human development index for making international comparisons of development. According to Brown and Sanders (1981), these approaches to measure 'development' could be applied to intra-national, smaller geographic units and use both census and survey data.

4.2.2 Some Recommendations for the Design of Migration Surveys

The design and implementation of migration surveys have a number of important problems, both explicit and implicit, that need to be considered. These include: (i) a clear understanding of the purpose of the survey, and definition of the sampling universe (demographic, spatial) and sample size meaningful for the purpose of the survey, and frequency of survey; (ii) an unambiguous operational definition of who is a migrant and the decision-making unit to be interviewed to obtain migration data; (iii) a distinction between the types of migrants, the distances moved, and the duration of a move away from the place of origin; (iv) a knowledge of the degree of detail, accuracy of the survey questionnaire, and the quality of the data obtained including the respondent and interviewer biases, and the specification errors arising from the research design; and (v) an understanding of the validity and appropriateness of the statistical techniques used in data analysis especially when data for different sizes of units are aggregated, and whether the usefulness of migration models be assessed according to their explanatory or predictive power (Todaro 1976, Chang 1981, Goldstein and Goldstein 1981, Bilsborrow et al. 1984, Mahadevan and Krishnan 1992, Blalock 1993).

Surveys provide more flexible instruments than censuses to collect specific types of migration information although censuses do not have to contend with the question of 'representativeness' that arises from sample surveys (Bilsborrow 1993) or, as in Tanzania, from migration related questions asked only of a sample of the total population enumerated in a census. DaVanzo (1981) noted that data limitations often are the cause of shortcomings in the study of migration based on micro-level behaviour, and she recommended the following approaches in the design and conduct of migration and mobility surveys:

i) use a longitudinal survey design where possible because it enables the measurement of the determinants of migration before a move is made, it allows moves made within the period between follow-up surveys to be identified through retrospective questions, and it makes available data on persons who actually moved, rather than those who intended to relocate;

ii) collect information at the finest possible level of geographic detail to measure migration; data on small areas can be aggregated where necessary but it is difficult or impossible to decompose information about large areas for micro-level analysis;

iii) questionnaires should ask about all moves and not only about residences at specific time points so that intervening moves are not missed; if only data on residences at specific time points are sought, then the time interval should be the smallest possible and information on seasonal migration, circulation and commuting should also be collected;

iv) a retrospective residence history should be obtained wherever possible since previous migration is often interrelated with subsequent moves and can be examined in the context of larger migration sequences; retrospective data can also be used to examine the determinants of the migrations;

v) data on location-specific capital, for example income in various forms, other sources of support like gifts, subsistence production, presence of family and friends who may constrain or facilitate migration should be collected;

vi) information on moves and migration decisions should be collected for all the members of a family or household that moves since the characteristics of the members may influence the migration decision of a particular member;

and,

vii) data on the communities of the origin and destination of migrants should also be collected since the quality of life, availability of services and employment, and living conditions at various places may affect the decision to stay, and where to move to. These characteristics and conditions change as communities and places experience development and/or under-development.

Hugo (1981) suggested that formal questionnaire surveys should be supplemented with information from intensive participant observations of individuals and groups, and a few detailed case studies of representative migrant and non-migrant households. This approach facilitates the interpretation of the statistical data from the formal survey, and may assist in formulating new concepts and hypotheses that can be tested with detailed surveys. The various suggestions were incorporated, where feasible, in this study of migration in Serengeti district.

4.3 The Migration Survey in Serengeti District

The major sources of data on the context and micro-level study of migration in the Serengeti district were a village-level survey, and a household-level survey. The main instruments of the two surveys were a village questionnaire and a household questionnaire. The questionnaires were targeted to a sample of chosen villages and households. The following sections describe the multi-stage sampling procedures, the characteristics of the chosen samples of villages and households, the conduct of the field surveys, and the content of the questionnaires used.

4.3.1.1 Sampling Procedures and Sample of Villages in Serengeti District

The estimates of net migration growth rates (section 4.1.5) were used to guide the selection of a sample of villages in Serengeti District for a detailed meso- and micro-level study of migration using appropriate questionnaires. The following criteria were used in deriving the sample of villages for further field surveys: (i) the 1978-1988 trends and rates of population change and estimated net migration in the wards and villages

(Appendix I), (ii) the agro-ecological variation in the Serengeti district, (iii) the differences in sizes of the village populations, and (iv) the proximity of the sample villages to minimize the costs of conducting surveys with limited financial, manpower, and transportation resources in an area of poor roads and difficult access to scattered homesteads. The availability of the vehicle for transportation was also limited since it was loaned from another project.

The wards of Serengeti district (as in the 1988 census) were categorized into one of five types according to the rates of population change and net migration during the 1978-1988 inter-censal period (Table 4.2). Wards with annual population growth rates above 5.6% (more than twice the assumed rate of natural increase of 2.8 % per year) were

**Table 4.2 Rates of Population Change and Net Migration In Wards:
Serengeti District, 1978-1988**

Ward	% Population Growth Rate/Yr	% Net Migration Growth Rate/Yr	Type
Ikoma	7.9	8.3	rapid in-migration
Mugumu Urban	5.3	3.5	rapid in-migration
Kenyamonta	3.3	0.6	low in-migration
Natta	3.0	0.2	low in-migration
Ringwani	2.7	- 0.1	no net migration
Kisaka	1.8	- 0.4	low out-migration
Issenye	0.6	- 2.5	low out-migration
Mugumu Rural	0.6	- 2.6	low out-migration

Source: Calculated from 1978 and 1988 Census Data

areas of rapid in-migration and wards with annual rates of population growth between 2.8-5.6% were areas of low in-migration. The wards with population growth rates about 2.8% were areas of no net migration; wards with growth rates between 0.0 and 2.8% per year were areas of low net out-migration; and wards with annual population growth rates below 0.0 % per year were areas of rapid net out-migration.

The rural wards of Ikoma, Natta, Issenye and Mugumu Rural were thus chosen for field surveys because they provided contrasting situations of rapid net in-migration (Ikoma), low or little in-migration (Natta), and rapid out-migration (Issenye, Mugumu Rural). Secondly, the wards could be classified into two major agroecological zones of the district: Mugumu Rural in the hills/ highlands, and Ikoma, Natta and Issenye in the upland plateau. Finally, these wards were adjacent to the Serengeti National Park and the closest in location to the supplies of fuel for transportation.

The procedure adopted for selecting villages for field surveys was as follows: (i) the villages of the Serengeti district were grouped according to the above population growth criteria into villages with rapid net in-migration, low net in-migration, no net migration, low net out-migration, and rapid net out-migration; (ii) each village was categorized according to its agroecological zone (hills/highland, upland plateau); (iii) villages were further sub-grouped according to their 1978 population size (small: < 1,000 persons, medium: 1,000-2,000 persons, large: > 2,000 persons); and (iv) new villages established in the district since the 1978 census were also included since they usually were the 'off-shoots' of larger villages. For example, the 1978 census village of Machochwe subdivided into Machochwe, Merenga and Nyamakendo; Rungabore divided into Rungabore and Gesarya; Rigicha into Rigicha and Nyankomogo; and Makundusi into Makundusi and Nyakitono.

Finally, villages were randomly selected within each sub-group to represent the net migration, agroecological and village size variations. A sample of 20 villages was identified for village-level surveys and within which household-level surveys would be conducted (Table 4.3). The sample of villages represents about 37% of the total number of villages (54) in the district during the 1988 census. Their total population accounted for 32.9% of the total rural population of the district, excluding institutional populations (e.g. prisons, barracks, etc.), in 1988.

**Table 4.3 Villages Selected for Field Surveys and Their Characteristics:
Serengeti District**

Village	% Population Growth Rate/yr	% Net Migration Growth Rate/yr	Type
Hills/Highland:			
Nyamburi	11.0	155.2	rapid in-migration
Bwitengi	6.3	56.2	rapid in-migration
Romchanga	5.6	44.7	rapid in-migration
Kebanchbanche	4.1	21.8	low in-migration
Itununu	2.9	5.2	no net migration
Koreri	2.3	- 2.5	low out-migration
Matare	1.6	- 10.6	low out-migration
Machochwe	- 2.2	- 47.9	rapid out-migration
(Merenga)			
(Nyamakendo)			
Rungabore	- 6.2	- 75.1	rapid out-migration
(Gesarya)			
Village	% Population Growth Rate/yr	% Net Migration Growth Rate/yr	Type
Upland Plateau:			
Nyichoka	5.5	43.5	rapid in-migration
Makundusi	8.3	93.0	rapid in-migration
(Nyakitono)			
Robanda	4.9	34.0	low in-migration
Rigicha	3.8	16.5	low in-migration
(Nyankomogo)			
Iharara	- 0.2	- 29.7	low out-migration
Motukeri	- 0.6	- 33.9	rapid out-migration
Singisi	- 3.0	- 54.5	rapid out-migration

Note: Names of new villages are in brackets; Rungabore village was not in the sample but Gesarya was included as a part of Rungabore in the 1978 census.

Source: Calculated from 1978 and 1988 Census Data

4.3.1.2 Village Survey and Questionnaire

The village survey questionnaire aimed to obtain information about the location, demography, economy, environment, land use and the social infrastructure of villages. These factors comprise some of the structural context in which decisions are made about migration and non-migration by people. The questionnaire was in English but the interviews with village government officials were conducted in KiSwahili and usually involved several members of the government. An initial field test was carried out in the village of Kisangura but no major changes were warranted in the content of the

questionnaire. The questionnaire was used as a guide in presenting the questions about the main issues of the migration study, and to note the responses and other information. All but one village-level interviews were carried out by the author of this dissertation in English and KiSwahili; the interview for Itununu village was conducted by an undergraduate student also proficient in both languages. The interviews were conducted during late July-early September, 1991. Usually, the interview sessions involved a flow of responses, comments, and discussion among the members of the village government (and sometimes other villagers present). These sessions took from 1.5-3.5 hours, depending on the number of participants in the interview. Only in one village (Nyakitono) was the interview carried out with the village secretary because the other members of the government were busy with prior commitments.

The village questionnaire had 12 (A-L) sections, and each section had several major, and some minor questions (Appendix IIa). A title page included instructions about conducting the interview. A preamble noted the name, geographic co-ordinates, and the date of village establishment. The meaning of village names were also noted. For example, Nyichoka translates as the place of snakes since KiSwahili and KiNatta for snakes is nyoka; the village of Makundusi derives its name from its red soil.

Section A aimed at collecting data about the village population structure, and migration into and out of the village since the previous wet season (Nov. 1990 - May 1991). Other questions pertained to the causes of in-migration and out-migration, and the source and destination areas of migrants. The second section (B) gathered information on the village economy and economic activities, the types of employment, and the occupations and places of domicile of persons that had moved out of the village to work, do business, study, etc. Information was also sought on markets held in the village, the types of crops traded in the village, the sources, costs and availability of farm inputs and tools, and the trends, over time, in the availability of agricultural inputs.

The subsequent two sections focused on the village location and social infrastructure. Section C dealt with the village location, its transportation links, and the availability of transportation services. The fourth section (D) enquired about the social infrastructure, including in education, health, sources and quality of water supply for people and

livestock. The types of personnel involved in the provision of social services and in village government were also noted.

Section E focused on the village resources and their use including sources and availability of wood and pastures, the rainfall situation and drought hazards, the types and quality of soils, the trends in soil fertility, and problems of erosion. Section F dealt with the availability and use of land by villagers, including the ways in which people acquired land, the village government regulations, if any, about the use of land and pastures, and the control of fires and other ecological hazards. Regulations on land use and hazard controls in villages were based on national and traditional laws, and even explicit village government rules. Many villages had fines and other sanctions for violating their regulations, for example setting fires or improper herding of livestock that damaged or destroyed property belonging to others. Village governments could, in the very extreme, revoke the right of residence in the village for persons involved in criminal activity.

Agriculture forms the mainstay of the village economy and livelihood. Section G queried about the cropping patterns and agricultural calendar practised in the village. The types of crops and their acreages grown in the village, the crops deemed as the most suitable for the soils and catena segments, and the periods during the year when land was ploughed, specific crops were sown, weeded, manured, and harvested was noted. Questions were also asked about the food adequacy and security in the village, the production of cash crops, and the ways in which land was allocated to in-migrants and what happened to land left by out-migrants.

Diseases and other ecological hazards, and the quality of life are important factors affecting the movements of people (Prothero 1965, Ford 1971, Kjekshus 1977). The eighth section (H) enquired about the the risk (high, medium, low, none) of specific diseases affecting people, for example malaria, schistosomiasis, trypanosomiasis, etc., and livestock, for example nagana, East Coast Fever, etc., as well as about the risk of environmental hazards, for example fires, vermin and pests, drought, erosion, and deforestation. Social problems that contributed to ecological hazards and insecurity, for example lack of facilities for waste treatment, and the incidence of stock rustling were

also examined.

The questions of Section I aimed at evaluating the trends in the overall quality of life in the village and in the level of satisfaction with the food, water, grazing, wood and sanitation situation. The level of satisfaction was assessed on a five point scale (very satisfactory, satisfactory, neither satisfactory nor unsatisfactory, unsatisfactory, and very unsatisfactory). The trends in the availability of specific resources, (e.g. cropland, grazing, water, wood and food supply), social services (e.g. clinic, school, transportation), and in agricultural inputs (e.g. farm tools, extension and veterinary services) were queried.

Section J was concerned with the inter-relation between population, migration and development. Its questions enquired about the ujammaa farming activities, the kinds of development projects that the village had considered as desirable or would like to initiate, and the availability of various resources (land, pastures, wood, water), finance and expertise, and equipment. The trends in the village population size, in in-migration and out-migration during the past decade and since the 1988 census were also queried. Questions were also asked about the changes expected in population in the next five years, the policies and concerns about migration and population, and also the trends in livestock numbers and the factors affecting them.

The eleventh section (K) of the village questionnaire focused on the human-wildlife interactions and impacts. The frequency and areas where specific wildlife species were seen, and their impacts on crops, livestock and people were recorded. The final section (L) noted information about the village location, its toposequences and typical catena, village boundaries (where defined), the altitude and cropping conditions. The locations of grazing areas and other land use zonation was also enquired.

4.3.2.1 Sampling Procedures and Sample of Households in Serengeti District

The aim of the sampling procedure was to derive a sample of Serengeti households that had in-migrated into the district since 1985 (defined as migrant households) and households that had not moved (defined as non-migrant households) during this period

as a control group for comparison to assess migration selectivity and the effects of migration. In this study, a household was defined as the group of persons living, sleeping and eating together in a homestead compound. A single person could form a household in a hut compound. An in-migrant was defined as a person or members of a household that had been granted, since 1985, residency and land to cultivate in a village by the local village government; an out-migrant was a person or household that did not occupy its homestead compound and cultivate its land for a cropping season while being away outside the village.

The procedure adopted in each of the villages to derive the sample of migrant and non-migrant households was as follows:

(i) In each village, the village government was asked for a list of the leaders of household cells and the names of heads of households in each cell. Such lists were available and members were also asked to identify cells that had both migrant and non-migrant households. Lists of households by migration status were not available but members of the government were able to identify such cells and their location, in-migrant and other households quite easily. Cells without a mixture of migrant and non-migrant households were quite rare in the villages. Only one village (Nyamburi) had cells with only in-migrant households.;

(ii) the names of the cell leaders were written on small, equal sized pieces of paper, folded twice and put into a hat or cap. Each name represented the cell. The cap was shaken to mix the pieces of paper and a person was asked to draw the desired number of cells for sampling in the village. The sampling rate for cells was 10% or 1 in every 10 cells. For example, if a village had 500 households in 50 cells, then the desired number of cells from which households were to be sampled was 5; if a village had 360 households in 28 cells, then a sample of 3 cells was drawn; and if the village had 130 households in 11 cells, then a sample of 1 cell was drawn. This procedure defined the cells, through the names of the cell leaders, from which the sample of households to be interviewed was to be drawn.;

(iii) the names of household heads in each of the cells drawn as a sample were numbered on the list (only available to the researcher) and also on small, equal sized pieces of paper. The migrant and non-migrant households were separated into two groups and the pieces of paper in each group were folded twice. The folded pieces of paper in the group of migrant households were put into a hat or cap, shaken vigorously, and a person was asked to draw a sample of migrant households that were to be interviewed. The same procedure was carried out for the non-migrant group of households in each cell. More than the desired number of households was drawn from each group and the order in which households were drawn was noted. The households within the desired number were the 'target' households and those drawn in addition to the desired number in each group were the 'alternate' households for interviewing.

The sampling rate among households in a cell was 30% or 3 in 10 households. Hence the overall sampling fraction was expected to be 3%. These values were arbitrarily defined but guided by sampling fractions in the censuses and other surveys, and the means available (funds, manpower, time, vehicle and fuel) to conduct field work: for example, Collier et al. (1986) drew a 6% sample of the population of the villages they surveyed in Tanzania, and Olofsson (1983) noted that the 1978 sampling fraction in rural Tanzania (mainland) was about 4%. The desired proportion of migrant to non-migrant households to be interviewed was about two-thirds; in cells dominated by migrant households, the ratio drawn favoured migrant households; when non-migrants households dominated the cell, the ratio favoured non-migrants. The names of household heads drawn for interviewing were noted.

The above multi-stage stratified random sampling procedure yielded the following sampling rates in each of the villages (Table 4.4). The first two columns show the number of households (No. of HH) as reported in the 1988 census and by the village government at the time of the survey in 1991 (July to September). The third and fourth columns show the number of household cells in 1988 and in 1991. The 1988 census did not publish data on the number of household cells in villages and thus the number of household cells then were estimated by dividing the number of households into ten households per cell. The result was rounded to the nearest whole number.

Table 4.4 Sampling Rates for Villages: Serengeti District

Village	No. of 1988	HH 1991	No. of Cells 1988	Cells 1991	Households Interviewed	% HH 1988	% HH 1991
Merenga	161	-	16	-	6	3.4	-
Machochwe	217	-	22	-	3		
Nyamakendo	246		25		12		
Matare	288	360	29	15	18	6.3	5.0
Koreri	302	176	31	13	9	3.0	5.1
Itununu	238	230	24	20	12	5.0	5.2
Kebanche'	291	300	30	27	12	4.1	4.0
Romchanga	353	123	35	14	5	1.4	4.0
Bwitengi	361	371	36	25	8	2.2	2.2
Nyamburi	484	513	48	36	5	1.0	1.0
Gesarya	203	200	20	20	3	1.5	1.5
Robanda	269	128	27	12	6	2.2	4.7
Nyichoka	303	260	30	10	11	3.6	4.2
Makundusi	188	22	19	3	9	3.5	4.4
Nyakitono	-	181	-	17			
Rigicha	265	362	27	26	20	4.4	5.5
Nyankomogo	186		17				
Iharara	248	194	25	13	11	4.4	5.7
Motukeri	430	310	43	16	13	3.0	4.2
Singisi	204	176	20	5	10	4.9	5.7
Highlands	3144	2697	294	270	93	3.0	3.5
Upland Pl.	2166	1633	241	102	80	3.7	4.9
TOTAL	5310	4330	535	372	173	3.3	4.0

Note: HH = Households; - no data available; Pl. = Plateau
Source: 1988 Census and 1991 Village Survey

Cells are referred to as 'Vyumba kumi' in KiSwahili (which translates into ten households) because during 'villagization', an average of ten households was made into a cell. The number of household cells in 1991 were as reported by the village government during the survey. This data indicated that the assumption of 10 households per cell was no longer valid.

Some villages, for example Romchanga, Koreri, Motukeri had very significant decreases in their populations during the 1988-1991 period. Some of the decrease may be due to an under-count of households in villages but more likely, the banditry and stock rustling contributed to insecurity and out-migration. Romchanga and Motukeri also had several households repatriated to Kenya since it was claimed that they were unofficial immigrants because they had not registered their status as immigrants. Both the 1988 census and 1991 survey data on number of households were used to organize the

sampling in villages (as in the last two columns) because of inadequate data, for example the unknown number of households in Machochwe in 1991, and in Nyakitono in 1988.

The fifth column shows the number of households interviewed in each village during the household survey and the last two columns show the number of the households interviewed as a percentage of the total number of households reported in the village in 1988 and in 1991. Where data on the number of households were not available for a village derived from the subdivision of a previous village, the total number of households in the sub-divided villages were combined to calculate the sampling fraction (% HH). Thus, data for Merenga, Machochwe, and Nyamakendo; for Rigicha and Nyankomogo; and, for Makundusi and Nyakitono were combined to calculate the 1991 sampling fraction.

A total of 173 households were interviewed of which 76 were migrant households and 97 were non-migrant households. Thus, the ratio of migrant households to non-migrant households interviewed was 0.78. Two of the interviews were incomplete: one of them was answered about half way and the other was completed only for the first two sections of the household questionnaire. No reasons were given by the respondents for not continuing the interview. The overall sampling fractions were between 3.3-4%, and higher in the upland plateau than in the hills/highlands agroecological zone. The proportion varied depending on whether the 1988 census or 1991 survey data on the number of households reported was used as the denominator to calculate the sampling fraction.

The 1988 census data were adopted as the base to calculate the sampling fraction because the census has better coverage and more reliable enumeration of village populations than local administrative counts, and because most villages were unable to provide data for their total populations in 1991. Thus, the sampling fraction based on the 1988 census data on households was 3.3%. The total sample population was 1280 persons (in 173 households) or about 3.7% of the total population (34714 persons) of the sampled villages in 1988.

While the sampling fraction may have been lower than that of Collier et al. (1986) or the 5% targetted for obtaining migration data in the census, a number of features of

the sample household survey data justified confidence for a study of migration. First, the sampling was sensitive enough to include households that had moved into the Serengeti area since the 1940's as well as those that had not moved during their lifetime. Second, some households were evacuated during the early 1950's from areas incorporated into the Serengeti National Park and during 'villagization' (1973-74) from near the boundaries of the national park, for example from Sibora village. The sample also included cases of households of these types. Third, all the major source areas of in-migrants into the district indicated by the macro-level analysis of census data were also represented in the micro-level data of households. This included immigrants from Kenya during the 1950's and 1960's. Fourth, the out-migration and return movements of people because of the socio-political conflict since 1985 were also represented. Overall, the sample included persons affected by all the major 'events' known to have affected population migrations in the Serengeti and its neighbouring districts during the past half century.

An additional structural feature of the sample population indicated the good reliability of the data. The survey of 173 households yielded a sample population of 1280 persons, of which the ages of 79 persons was unknown. The population with known ages was categorized into 8 groups (0-4, 5-9, 10-14, 15-24, 25-34, 35-44, 45-54, 55 > years). A comparison of the age structure of the sample population with that for the surveyed villages during the 1988 census indicated no significant differences (Likelihood Ratio $\chi^2=8.851$, $df=7$, $p=0.264$). The sample population was representative of the villages' population age structure as enumerated in 1988. However, there was a significant difference in the age structures of the sample population and the 1978 enumerated population of the villages surveyed (Likelihood Ratio $\chi^2=28.508$, $df=7$, $p<0.001$).

About 46.7% of the sample population was male as compared to 47.9% males in 1978 census and 47.6% males in the 1988 census of the surveyed villages. The censuses indicated about 0.9-1.2% more males than in the sample population. In the survey, the average household size was 7.4 persons as compared to an average of 6.4 persons per household in the villages surveyed in 1988. The 1988 census indicated that mean household size in the villages varied from 5.1 to 9.2 persons. The observed difference in the mean household sizes from the 1988 census and the 1991 survey were not

considered to be significant enough to invalidate the survey data.

4.3.2.2 Procedures for Interviewing of Households

The survey of one hundred seventy three households was carried out by a team of four interviewers who spoke KiSwahili and English, among other languages. The questionnaire was in KiSwahili and interviews were conducted in the language, except in the case of three households whose interviews were conducted in tribal languages. One interviewer (author of this study) had post-graduate training, one was an undergraduate at the University of Dar es Salaam, and both were proficient in English and KiSwahili, and some tribal languages. The other two interviewers had secondary school training, understood English and were proficient in KiSwahili and other tribal languages of the Serengeti district. All the interviewers had previously been involved in field research. A fifth interviewer was briefly engaged to conduct some interviews in one village (Bwitengi).

The interviewers were made familiar with the contents of the questionnaire and procedures to conduct the interview. A pilot test of the household survey questionnaire could not be conducted before the main field study because the facilities to type stencils and cyclostyle the questionnaire were available only in Arusha city, more than 350 km from the study area. Some questions were added to the questionnaire in the first few days of surveying, for example on the comparison in quality of the land in the village and in the Serengeti National Park.

Overall, an indication of the level of difficulty of the questions had been available from the several persons consulted during the course of the translation of the questionnaire and necessary changes were made to keep the questions simple for both the interviewer and respondent, to structure the questions into cohesive themes in each section, and to provide adequate space for easy reading and recording of questions and answers. Some questions were repeated in different sections as a cross-check for earlier queries; for example, the reasons for moving were elicited in a specific question about the causes of migration and again was asked whether the migration took place because of inadequate food and/or income availability or any other causes in the section on food

and income security. Provisions were also made to note 'non-response' or 'don't know' as answers to questions.

The four interviewers were assigned the names of cell leaders and the heads of households within the cell to be interviewed. If a 'designated' household was absent, no adult was present, or an interview was declined, the interviewer was to go to the first 'alternate' household to conduct the interview. If the first 'alternate' was absent or declined to be interviewed, then the second 'alternate' household was to be interviewed, etc. All the interviewers usually went to a cell together to conduct the interviews so that cell members chosen for interviewing did not get an opportunity to discuss the questions asked and also because it made the logistics of locating cells and the households for interviewing easier. Any problems encountered during the field work also could be discussed and rectified easily.

Directions about the location of a targeted cell were sought and the interviewers either drove, or usually walked to the location. Sometimes a member of the village assisted in locating the cell; usually directions were sought from people on route to maintain the anonymity of respondents. The cell leader or the deputy were approached and their consent to conduct interviews in the cell was sought. This co-operation was always granted since the village government had been informed about the study and visit by the research team in advance. Sometimes, the cell leader was a part of the sample of households in the cell to be interviewed.

Generally, the head of the household was first sought as the respondent and in whose absence an adult member was interviewed as a substitute. The purposes of the study were first explained and the respondents assured of the confidentiality of their answers. Only in one case was the head of the household, the grandfather, unavailable for the day and instead a 12 year old school boy was interviewed because his elderly grandmother was not too well. But, both contributed to the responses. All other respondents were in the survey were adults.

The average interviewing time for the questionnaire was between 1.5-2 hours at a relaxed pace; interviews of non-migrant households were usually faster because some of the sections, for example, the conditions in their village of origin were not applicable.

The interview was interrupted whenever the respondent desired a break. Incomplete interviews were scheduled for an alternative period, often several days later depending on the arrangements made for work in other places.

The respondents of a random selection of households that had moved into the village before 1985 were also asked questions about the conditions and reasons for moving and to narrate their experiences before moving, during relocation and in process of re-establishing their households and life in the destination. This made useful historical information available, especially about the movements during the 1950's and 1960's.

Poor roads, rugged terrain, limited fuel supplies and breakdowns in the car caused delays and disruptions, but none serious enough to stop the field study. The return to Nyamburi village to complete the rest of the interviewing (15 more households were planned) was not feasible because Nyamburi river was not fordable after thunderstorms. A survey of one village (Nyansurura) not in the original list of selected villages was desired because it had the highest relative loss in its population during the inter-censal period. But the idea was abandoned after a reconnaissance visit because of concerns about conducting a study in a village that had been affected by some of the most violent banditry in the district. The conflict resulted in the destruction of its school and other village buildings.

In early September 1991, a quarantine was imposed on some villages because of an out-break of meningitis. Thus, plans to visit the Kisaka, Kenyamonta and Ringwani wards of the district were abandoned. These wards had not been included in the original selection of wards because of their farther distance and the limited fuel availability. But field surveys were successfully conducted in the wards and villages targeted for the study of migration. Time was also spent in gathering information on the agriculture and land use in the district from the offices of the district headquarter in Mugumu town.

4.3.2.3 The Household Survey Questionnaire

The household questionnaire (Appendix IIb) had a total of 92 major questions and was sub-divided into 15 sections (A-O). Some major questions had sub-questions. A title page included sections for the identification of the village in which the interview was

conducted and the status, in the household, of the respondent. The page also included instructions for the interviewer to follow in the conduct of the interview, including to advise the respondent of the purpose of the survey, to state clearly that it was not compulsory for the respondent to participate in the survey and not to answer any question unacceptable to the respondent, and that the responses were confidential. The interviewers were instructed to conduct the interview only if there was no extra-household member around, not to discuss the contents of any interview with any person, and not to inform anyone about the identity or homestead location of any respondent. No names were to be noted. The instructions also included provisions for noting incomplete interviews and arrangements made for a follow-up.

Section A of the questionnaire dealt with the demographic, educational, and occupational characteristics of the members of a household, including the status of each member of the household. It also included a question on the languages spoken by members of the household in general, and the period of residence in the place currently inhabited. Section B sought information on the place of birth, and the life-time residential history of the members of the household. Interviewers were to use designated periods (before independence, before villagization, after villagization, 1978 census, 1985 national election, 1988 census, 1989-90 wet season, 1990-91 dry season, 1991 wet season) as a general guide to query residential history, but to note specific calendar years where possible.

The third section (C) queried about migrations of household members associated with marriage, and birth places of children born in their mother's place of origin. Often, women move to their parental home for emotional and social support for child-birth. Section D aimed to gather data on migration associated with employment and education. It also included queries to determine the presence of members in the household that were from other families, related or otherwise.

The fifth section (E) asked about the causes of migration, the reasons for choosing the place of migration destination, the processes of relocation, and the types and purposes of assistance obtained in the processes of re-settlement. An extensive check-list of causes was provided for the interviewer to record the reasons stated for migration by a

respondent. But, the relative importance of each reason, among multiple causes, was not evaluated because respondents may rationalize post hoc the importance of specific causes of moving.

The section also queried whether the entire household relocated from the place of origin, about those who remained or went elsewhere, about the mode and duration of relocation, and the sources of information for the migrant about the destination chosen or other potential places to migrate. The types, purposes and sources of assistance (paid, family and relatives, msaragambo, etc.) obtained by migrant households in their re-settlement were also noted.

Section F queried the migrant about the availability of and level of satisfaction with resources, social services and amenities, farm inputs, other goods and veterinary services in their villages of origin. A five point scale (very dissatisfactory, dissatisfactory, neither dissatisfactory nor satisfactory, satisfactory, very satisfactory) was used to rate the responses about the level of satisfaction. Similarly, a five point scale (very low, low, medium, high, very high hazard) was also used in recording the respondents assessment of the ecological hazards in their villages of origin. Section G asked the same questions about the place of residence of respondents, both in-migrant and non-migrant.

In addition, in-migrant respondents were asked to rate their access to resources (e.g. amount of land, soil fertility, pastures, etc.), the availability and quality of social services (school, clinic, water supply, transportation, etc.), farm inputs and veterinary services (availability, prices), extension services and leadership, and to evaluate the health (e.g. family, livestock, crops) and environmental situations (e.g. rainfall, etc.), in their present place of residence as compared to in the village of previous residence. Respondents were also asked to rate their overall life conditions in their present villages as compared to in the previous village, in the neighbouring village and town and in other villages of the district and administrative region. This latter question aimed to gauge the 'information-shed' of migrants and context of their migration decision about potential migration destinations. A five point scale (very much worse, worse, neither worse/better, better, and very much better) was used to record the respondents assessment of the change in their specific and overall life situation and living conditions.

The eighth section (H) queried about the potential migration, specifically for return by in-migrants to their place of origin, and any consideration of moving to any other location, within the village or other places. This section also aimed to assess the level of satisfaction of in-migrants in choosing the village of destination as a place to live.

Section I focused on the social ties and networks of households and the role of social factors in migration. In-migrant households were queried about their level of satisfaction with relations to other family members, relatives, friends, neighbours, village leaders, and other villagers in their place of origin and village of residence. Non-migrant households were also asked the same questions. The level of satisfaction was recorded on a five point scale (very unsatisfactory-very satisfactory). The change in the level of social relations associated with migration was also assessed on a five point scale (very much worse-very much better).

All households were also asked about the frequency and participation in various village activities, for example ujamaa farm, security patrolling, building and maintenance of school, clinic and other public buildings, membership of committees and programmes (e.g. village government, women's organization, improved health and sanitation, maternal and child care, etc.). Respondents were also asked about the sources from which they would seek needed resources and assistance, for example land, loans, labour, oxen for ploughing, farm inputs and implements, food and other basic needs.

Finally, respondents were also queried if they had migrated from their previous village because of conflicts with family members, relatives, friends, village or religious leaders, and other villagers; and, about the likelihood of their moving, within the village or to another place, to improve social relations. If a move was considered or intended, would the whole household move or some members only? Where would they move to?

A major objective of the study was to assess the changes in the 'agroecological locus', as hypothesised to be associated with migration (chapter one). Some of these changes were envisaged to occur as mediated through the changes in the 'spatial locus' and 'social locus' consequent to migration. The questions in Section J queried about the sizes, catenary locations, walking distance in minutes, soil type, color and fertility of each plot of agricultural land, the crops grown along with the techniques used (rotation,

inter-cropping, manuring, ridging, erosion control, fallowing, crop residual disposal (burning, ploughing in), the number of weedings, vermin control, mode of acquisition, use of extra-household labour, farm tools and ploughing techniques, and level of yields and number of crops per year. All households were interviewed about their agroecology, and in-migrants were also queried about their agricultural activity in their previous village of residence.

Questions were also asked about the trends in the fertility, yields, weeds, vermin and pests, erosion, salinization, and the level of labour inputs in the croplands to assess the general relationships between ecological conditions and hazards, and yields and intensification with labour inputs. The sources of labour (from within and extra-household) for various activities (clearing, hoeing, ox-ploughing, ridging, sowing, weeding, manuring, vermin and pest control, harvesting) in each plot of cropland were recorded. The sources of labour used in post-harvest processing, transportation and marketing of crops, and in the purchase of farm inputs was also examined.

In rural Tanzania, the possession of livestock is an important factor in differentiating the level of wealth of households, perhaps more so than income and land ownership (Collier et al. 1987). Livestock are an important component of the rural economy and social life in the Serengeti district, especially because of the large rangelands closer to the boundaries of the Serengeti National Park and the use of livestock in market transactions, as a measure of status, and in marriage dowries. Section K queried about the ownership of livestock, the location (on the catena, in and outside village area), availability and use of pastures and water during the various seasons (wet, wet-dry transition, sowing, harvesting, dry seasons). Questions were also asked about fodder crops grown, the ways of herding livestock (individual, household groups, communal) and the diseases that had or were affecting livestock in their previous place of residence and in the village inhabited.

Section L focused on the relationship between food availability and security, income, and migration. The causes of adequate and inadequate food production and security, the sources of foods for subsistence (grown, gathered, hunted, bought, gifted, exchanged, borrowed, etc.), and the crops grown as a food reserve were noted. The trends in

household food situation over the lifetime, since independence and villagization, in the five years and a year before migration, since 1985, 1988, and in the past year (1990-1991) were queried. Questions were also asked about the sources, adequacy and causes of inadequacy, and trends in income. Respondents were also queried about the level (national, regional, district, village, friends, relatives, and family) at which food and income securities ought to be planned and implemented. The final question of the section asked about the likelihood of the household moving from the village in specific circumstances, for example because of the lack of sufficient food, water, security, income, etc., or to improve security, income, etc.

Section M asked questions about the housing conditions and noted the materials used in the construction of the homes, the possession of household items, the availability and distances to sources of water, wood, clothing and medicines, and the ownership and borrowing/renting of farm implements. These questions were also asked of in-migrants about the conditions and situations in their places of origin. While such questions may be useful in assessing the wealth and quality of life of households, the data may also indicate that there are few differences between households, for example in the types of materials used for constructing homes, and in accessibility to communally owned water and wood supplies. Their importance in life is undeniable but the little variation between households in the quality and life conditions may not be very useful in explaining the decision to move or not to move by households.

Section N of the household questionnaire dealt with the interactions between people, livestock and the wildlife of the Serengeti district. The presence of large and diverse wildlife populations of the Serengeti present economic opportunities as well as significant environmental hazards. Questions were asked about the types, numbers (very many, many, few, very few, none), location (within village, village boundaries, neighbouring village, forest reserve, national park) and seasonal presence of wildlife observed, the trends in wildlife population sizes, and the losses of crops, livestock and human life from wildlife attacks in the present and previous village of residence.

Respondents were also asked to assess the value (gain, neither gain/loss, loss, don't know, no answer) of the Serengeti National Park to their household, village and the

country, to comparatively rate the quality of land in their village as compared to that in the national park, and indicate their desire or need to cultivate, graze livestock, gather foods and wood, hunt in and tour the Serengeti National Park.

The last section (O) of the questionnaire focused on the issues of population, resource availability and development. The respondents were asked about their perceptions of trends in population size, in-migration and out-migration in the village and previous village of residence, expected population changes in the future, to rate the availability of specific resources (land, pastures, water, wood, schools, clinics, food, roads) with respect to populations in the village of residence, in the neighbouring village, and in the previous village of residence; to evaluate the trends in development over time (since 1961, 1974, 1980, 1985, 1988); and to state their priorities of development problems and projects desired.

The last question aimed at assessing relative deprivation as perceived by the respondents. It asked them to rate their amount and quality of land, livestock possession, food situation, quality of life, and income as compared to the majority of villagers in their present villages, previous villages, and in neighbouring villages. A five point scale (very much better than, better than, same as, worse than, much worse than) was used in assessing relative deprivation.

4.4 Analysis of the Survey Data

The data were analysed with the SYSTAT (Wilkinson 1988) package of statistical programs on a desktop microcomputer. The main analytical tools used were cross-tabulations, analysis of variance (both one-way and two-way ANOVA), and multivariate linear regression modelling. Principal components and principal axis factor analysis, with Varimax rotation, were sometimes used to explore the underlying structure of relationships between several variables and to reduce the data structure while maintaining as much of the original variation as possible.

One-way and two-way tabulations were usually generated; rarely were more complex models derived because of problems of inadequate number of cases in some cells. Chi-square tests based on less than five observations in 20% or more cells are suspect

(Wilkinson 1988). When more than 20% of the cells had less than five observations in a cell, the frequency groups were combined to reduce the number of cells with inadequate observations in each cell. Both the Pearson and the Likelihood Ratio Chi-square statistics were derived and the results of the Likelihood Ratio Chi-square was used in assessing significant differences in the frequency distributions of observations for groups on a particular variable. For 2*2 tables, Fisher's exact test was used with less than 50 total cases; otherwise Yate's corrected chi-square was used. The Mantel-Haenszel statistic was used to test the significance of association between two binary variables while controlling for a stratification variable. An example would be the association between the use of ox-ploughing and extra-household labour by migrant and non-migrant households. Cases with missing data on any variable were eliminated before any tabulations and test statistics were derived.

The Bartlett's chi-square test statistic was used to determine if the variances of groups being compared were homogenous before any analysis of variance was carried out. The Tukey HSD test was used in multiple comparisons of the means of more than two groups; the test was also favoured because SYSTAT included an adjustment for unequal numbers of observations in the groups being compared (Wilkinson 1988). The procedure of the Tukey HSD test provided the matrices of pairwise absolute differences in means and pairwise comparison probabilities.

The multivariate linear regression modelling used the forward stepwise regression procedure to identify those independent variables that, on theoretical grounds, contributed significantly to explanation of some of the variation in the dependent variable. Rarely were predictors that were significant at 0.1% level (for a two-tail distribution) retained in the regression model; usually variables with probabilities of 0.05% or less were accepted as significant predictors. Once a subset of significant predictors was identified, the regression model was re-estimated using the subset to avoid introducing roundoff error that can occur when a large number of steps are computed and particularly if the predictors are highly inter-correlated (Wilkinson 1988).

The eigen values, condition indices, variance proportions and the correlation matrix of regression coefficients were examined during each regression analysis to assess the

level of collinearity among independent variables and to detect the presence of extra predictors than necessary to obtain stable regression estimates. Only those variables that had an associated condition index below 30 was retained; Wilkinson (1988:465) notes that a condition index larger than 15 indicates a possible problem with collinearity, and a condition index greater than 30 is characteristic of a serious problem with collinearity.

Variables with eigen values near zero and highly correlated regression coefficients are indicative of a presence of more independent variables in the regression model than necessary for deriving stable regression estimates. In such cases, decisions were made, on theoretical grounds, to include a specific variable and exclude its highly correlated co-predictor. The regression residuals were also inspected to identify cases that were outliers or had undue weighting in the regression estimates. The household with about 50 acres of land in 1991 and another household with 55 acres of land prior to migration were the major outliers repeatedly detected in the regression models relating the size of land holdings and acreage cultivated by the household or per capita and their demographic, locational, technological and ecological determinants. But these outlier cases were retained in the analysis because the reported land holdings were plausible since isolated homesteads at the peripheries of villages could have access to considerable amounts of land when compared to households located within the core of a village. No first order auto-correlations were found to be of importance in any of the regression models.

Overall, in this study a model was judged as useful for its explanatory rather than predictive power because it was expected that regressions based on micro-level data were unlikely to account for very large proportions (>50%) of the total variation in the dependent variable.

Chapter Five

Population Growth and Migration In and Around Serengeti District: Macro- and Micro Level Perspectives

An increase or decrease in the size of the population of an area, at the macro scale, or of a household, at the micro scale, is determined by the levels of fertility, mortality, and net migration. Population redistribution results from the differential rates of the three demographic components in space and over time (Elahi et al. 1980); the rates of fertility, mortality and migration for areas represent the aggregate values of the incidence of births, deaths and migration experienced by households (Mitchell 1969). Thus, macro and micro level perspectives complement each other in the analyses of temporal, spatial, and structural trends of populations. In addition, the ecological, the economic, the political, and the social and the psychological factors that cause and influence the processes of population dynamics need to be examined at the different scales. An analysis of changes in population size and distribution in the Serengeti area is useful in defining resource and population related policies for programmes of agricultural, rural and regional development, and in planning and managing ecological and wildlife conservation (Watson 1967, Bell 1969, Kurji 1978).

This chapter examines the patterns of population growth and redistribution in the Serengeti region at both the macro and the micro scales, and the inter-relation between changes in the demography, environment, and agroecology. First, the chapter describes the role of migration in the peopling of the eastern Lake Victoria region and the Serengeti district. Next, it examines the trends in demography, land use and economy of the region prior to and following European contact with the indigenous peoples around the mid-19th century. The spread of newly introduced diseases that coincided with and accompanied the expansion of trade and colonization led to an agroecological collapse between the 1890's and the mid-1930's. The collapse reduced the human, the livestock and the wildlife populations in northern Tanzania. Migrations of people were one of the causes and the consequences of the agroecological collapse. The third section of the

chapter outlines the subsequent demographic and agroecological recovery, including the repopulation of previously abandoned lands. Population growth and redistribution following 'villagization' in 1973-1974 is also examined. The program to consolidate scattered homesteads was carried out to improve the provision of social infrastructure and to promote rural and agricultural development (Collier et al. 1986). It significantly altered the local patterns of population distribution, agriculture and migration.

5.1 The Peopling of Eastern Lake Victoria and Serengeti District

Little is known about the population dynamics of the inhabitants of the Serengeti region in evolutionary and early historical times. However, local and long-distance migrations have been an integral part of the processes of the peopling and the agricultural development in the Serengeti area. Iliffe (1979) has suggested that mainland Tanzania was a 'frontier' territory being settled by African colonists around the beginning of the 19th century. The population grew in the territory then because of this migration. But archaeological evidence indicates that the Serengeti was part of an eastern African evolutionary hearth and a locus of early stone tool making (Leakey 1965, Hay and Leakey 1979). Hominids, particularly *Homo erectus*, and *Homo sapiens* from this hearth adaptively radiated in the past two million years to occupy the global ecumene. The fossil hominid footprints of Laetoli are over 3.5 million years old (Hay and Leakey 1979). Fossil fragments from Olduvai Gorge have shown a presence of *Australopithecus* (*Zinjanthropus*) in the area during 1.8-1.25 million years ago (Mya.), of *Homo habilis* 1.8-1.5 Mya., and of *Homo erectus* probably between 1.5-0.5 Mya. A fossil specimen of *Homo sapiens* has been dated at 17,000 Before Present. The impact of humans through the use of fire has been most significant in the Serengeti in the last 3,000 years and it has produced the savanna vegetation of the region (Sinclair 1979a). Thus, McNaughton (1989) has suggested that the Serengeti is probably the oldest ecosystem inhabited and ecologically affected by the activities of humans and their progenitors. The agricultural adaptations that people in various parts of Tanzania have accomplished to suit highly varied local environments also argues for a long presence of people in the territory (Koponen 1988).

The present inhabitants in eastern Lake Victoria region are not the direct descendants of the fossil ancestors from Olduvai Gorge and Laetoli. Instead, they comprise a wide variety of African peoples of diverse regional, ethnic, cultural and linguistic origins (Southall 1961, Sutton 1971, Anacleiti 1977, Koponen 1988) and "Their history is one of dispersal and mingling as communities split up and wandered farther afield to new settlements" (Tobisson 1986:88). The successive waves of migration were in search of resources to satisfy needs, to avoid droughts, diseases, and famines, and because of territorial disputes, wars and conquests (Southall 1961). The arrival of in-migrants often triggered off renewed dispersal from an area. These movements were usually made as large ethnic groups rather than by individuals and households (Ominde 1975) as is more characteristic of contemporary migration for wealth, education and opportunity (Southall 1961).

During the late Stone Age, the eastern Lake Victoria region was occupied by nomadic bands of Bushman-type hunters and gatherers who probably spoke Khosian like 'click' languages. The Hadzabe of Lake Eyasi basin seem to be their descendants (Southall 1961). About 1,000 B.C., Chusites (e.g. the Irawq) moved from Ethiopia into Kenya and the Rift Valley zone of northern Tanzania (Sutton 1971). They brought grain farming and livestock. Bantu cultivators with iron-technology began moving into the Serengeti region in the early part of the first millenium A.D. and their movements continued in the second millenium A.D. Some of the Bantu were hunters. Hunting and gathering remain important in the livelihood of many people of the area. Among the Nilo-Hamitic pastoralists, the Tatoga migrated into Tanzania through Kenya in the second millenium A.D. while the Masai arrived in the past two centuries and settled in areas not occupied by Bantu farmers. Large portions of the Serengeti became a part of the Masai nomadic range and their presence checked the expansion of the Bantu. The Nilotic Luo migrated from southern Sudan and settled in northeast Uganda, and along the eastern shores of Lake Victoria in Kenya and Tanzania.

The population of eastern Lake Victoria region and in Serengeti district is mainly Bantu (Tobisson 1986, Sutton 1971). They dispersed from 'Misri' (near Mount Elgon) through Kenya (e.g. some of the Kuria) and by going around Lake Victoria, e.g. the

WaSukuma, Jita, WaKerebe, WaKara, etc. (Figure 5.1). The Walkoma, Wassenye, the Natta, and WaNgoreme of Serengeti district claim an ancestral origin from 'Regata', near Sonjo in Masailand (Anacleto 1977). These Bantu groups share similarities in language and culture, and often in migration histories and ancestral legends. For example, the WaKuria, Walkoma, Wassenye and the Kwaya have similar names for the periods in their agricultural calendars, and similar organization of generation classes and similar categories for supernatural beings (Tobisson 1986).

Social organization and interactions among pre-colonial Africans "did not correspond to the colonial idea of 'tribe'" (Koponen 1988:42-43) but instead comprised of functional 'societies' in which social relations and reciprocity were practised. Such 'societies' perhaps were 'language-production' groups; for example, the Nilotic herders, and the Cushitic and Bantu agriculturalists (Koponen 1988:50-51). But these groups also had and have disputes and battles between each other and also among clans within. The social unit of 'clan' often had a 'spatial' dimension in the form of 'clan-territory', for example among the WaKuria, and which was defended by force if necessary (Tobisson 1986).

Until the 19th century, the social, the economic, the cultural and the political patterns and structures of societies in the eastern Lake Victoria region evolved from their inner dynamics (Koponen 1988). This endogenous development, of mainly African origins, involved advances in production, population growth, and settlement of new lands. The productive and reproductive systems and ecological control were adapted to local micro-environments and labour productivity was high. Only thus could the various peoples have survived the diseases, droughts, wars, slavery and other destructive and disruptive factors.

How the relationship between mobility and development, as proposed by Zelinsky (1971, 1979) in his Mobility Transition Model, has unfolded in the Serengeti area over evolutionary and historical time remains to be seriously researched. Two specific questions that need to be addressed in the context of the Serengeti archaeological findings and the peopling of eastern Lake Victoria are: first, to what extent are other societal transitions a necessary condition for mobility transitions in pre-industrial societies?; and secondly, is technological development a sufficient, but not a necessary, condition for a

Figure 5.1 Pre-20th Century Population Movements into the Eastern Lake
Victoria Region, Tanzania

Source: Adapted from Tobisson, 1986



mobility transition? After all, *Homo erectus* appears to have migrated on the global scale without having become even an agriculturalist and perhaps with only very early Stone Age technology. The issues of mobility and development in agrarian and pre-industrial communities forms the relatively little researched 'roots and lower-limbs' of the Zelinsky paradigm.

5.2 Population Distribution, Settlement and Land Use Before the 20th Century

The major competing views of pre-colonial African life and history have been categorized by Hopkins (1975) as the 'Primitive Africa' and 'Merrie Africa' models (Koponen 1988). Iliffe (1979) has emphasized the poverty, diseases, social strife, harsh environment, underpopulation, and the 'frontier' character of a country that was settled rather recently by African colonists, i.e. the concept of 'Primitive Africa'. In contrast, Kjekshus (1977) advances the 'Merrie Africa' view of pre-colonial life with long settled, thriving communities that knew and practised sophisticated agriculture, developed technology and involved in commerce, had more than enough food and abundant cattle, were in control of the environment, and had neutralized the hazards of tsetse fly. Koponen (1988) argues that the reality was more locally defined and the conditions in different societies were likely in between the two proposed extremes. African societies were complex, dynamic and mobile, and formed a mosaic rather than spatially distinct patterns of social situations.

European explorers first made contact with the African inhabitants of eastern Lake Victoria region around the middle of the 19th century. They found well populated and thriving agricultural and commercial communities, especially closer to Lake Victoria (Speke 1863, Stanley 1880). Kollmann (1889) observed densely populated settlements with well developed agriculture in the Natta and Ikoma areas, and an 'El Dorado' of wildlife in the area between the Mbalangeti and Grumeti rivers in the Serengeti district (Figure 5.2). Hunting, fishing, weaving of baskets and beekeeping were important in the local livelihood. The diversity of products from Serengeti's varied environment resulted in long-distance trade and exchange of commodities, and also prompted alliances between the various social and ethnic groups (Christiansson and Tobisson 1989). Caravans traded

Figure 5.2 The Eastern Lake Victoria Region, Tanzania



salt from Lake Eyasi and iron hoes and knives made by Nyaturu ironsmiths to the WaSukuma, and transported ivory and slaves from Uganda to the Tanzanian coast. But these prosperous communities were also periodically afflicted by droughts, famines and epidemics, and some warfare associated with cattle raids and land disputes (Iliffe 1979, Koponen 1988). Slaves were mainly captured in Uganda but their passage through the Serengeti area may have helped to spread diseases and terror among local communities.

The arrival and settlement of the Arabs, Europeans and Asians along the trade routes greatly increased the local and regional commercial activities and integrated the interior of Tanzania with the rest of the world via the coast. Exogeneous forces began to assume an increasingly significant role in the development of the peoples and societies of the eastern Lake Victoria region and the rest of the country (Koponen 1988). By the mid-1880's, some Arab traders had settled in Nassa south of Speke gulf and The White Fathers had established a mission station at Bukumbi, near Mwanza. The introduction of exotic diseases, for example smallpox and cholera, the slave trade and colonization were the most profound of the pre-20th century forces of change from outside Africa. New crops such as sisal, Egyptian cotton, citrus fruits and coffee were also introduced in various parts of the territory. Mercantile interests and imperial ambitions led to an intense rivalry between the Omani sultanate of Zanzibar, the Germans and the British, and to eventual colonization by Germany in the mid-1880's.

The German colonial authority embarked on setting up an administrative structure based on 'tribes' led by 'chiefs', suppressing anti-colonial rebellions like Maji Maji in central Tanzania and those of the Kuria in Tarime highlands (Tobisson 1986), building roads and railways, and opening mines. The missions began to promote some education and health care along with the faith while the colonial government also began to build schools, hospitals and water supplies. Some European settlers established large estates for growing export crops like sisal, coffee and rubber. These developments resulted in labour migrations, often across the country.

5.3 Population, Settlement and Land Use Patterns During the Agroecological Collapse 1890's - 1930's

The patterns of settlement and land use were dramatically altered during the period from early 1890's to mid-1930's. A series of natural and man-made ecological catastrophes caused the collapse of the agroecological system in the eastern Lake Victoria region. Consequently, morbidity and mortality among human populations increased (Kuczynski 1949, Koponen 1986), especially during the 1890-1920's period. This collapse took place because of the complex ecological linkages between people, livestock, tsetse fly, wildlife, and vegetation.

The first major disaster followed the outbreak of rinderpest, a viral disease whose natural host is cattle (Ford 1971, Sinclair 1979a). By 1892, rinderpest had killed off 95 % of the cattle of Ngorongoro and Serengeti (Sinclair 1979) and reduced the Masai to death by starvation (Baumann 1894). The disease spread west into the farming communities towards Lake Victoria and people attempted to escape the devastation of disease and famine by relocating their settlements (Stanley 1890, Kollmann 1889). Hunger exposed people to other calamities: smallpox and cholera were spread by infected persons searching for food and once again became epidemic (Koponen 1988).

At the turn of the century, the spread of tsetse fly infested bushland became noticeable (Ford 1971) as the bush regenerated in areas where people ravaged by rinderpest, droughts, locusts, smallpox and jigger fleas, and soil exhaustion were too weakened to maintain their cultivation or abandoned their fields and moved. Sinclair (1979a:5) has noted that "The indirect consequences of rinderpest mediated through the wild mammal population may have been even worse than these disasters". The rinderpest initially killed off most of the wildebeest, buffalo and giraffe. Lions, deprived of their usual wild prey, took to man-eating which in turn terrorized people and contributed to rapid depopulation. A sufficient density of people and level of agricultural activity was necessary to keep the land open and free of tsetse fly-bush habitat (Gillman 1936). The depopulation and decline in hunting latter allowed wildlife, a reservoir of trypanosomes, to increase in bushlands and provide an expanding link in the spread of sleeping sickness among people and cattle.

The spread of sleeping sickness across the eastern Lake Victoria region occurred from a local endemic area, most likely in the Maswa district (Ford 1971). Survivors of these catastrophes continued to retreat towards Lake Victoria to escape the expansion of the bushlands from the south and east. The movement of people and cattle infected with trypanosomes may also have contributed to the spread of sleeping sickness. The German administration proposed a scheme to halt the advance of the tsetse fly but nothing was done and the method to form the barrier was unclear (Kjekshus 1977). They instead focused on evacuating people after the outbreak of sleeping sickness (e.g. from Rubondo and Maisome Islands), and also consolidated scattered huts into compact village concentrations to combat the disease (Malcolm 1953). The ravages of the disease were further exacerbated by colonial policies requiring indigenous peoples to labour on civil works, e.g. road construction, in cash crop estates, and fight in the First World War. Such demands deprived the native peoples the labour needed for food production (Martin 1961b).

The impact of sleeping sickness, the depopulation and the agroecological collapse were widespread: for example, by the early 1920's, settlement south of Lake Victoria and west of Smith Sound was confined within 25 km of the lakeshores; settlements along the eastern shores of Speke Gulf and the Ruwana-Grumeti River confluence, and east of the headwaters of the Simiyu river were abandoned (Ford 1971) while White (1915) found inhabitation only west of the Ikorongo mountains. Much of the valleys of the major drainage was depopulated. People retreated to the higher interfluvies that were less hospitable to tsetse. Their shallower and sandier soils inhibited the growth of bush thickets and previous agricultural activity had turned the interfluvies into open grasslands with a few trees. In the Ikoma area, the concentration of people became greatly reduced as the local people became incapable of checking the advance of tsetse fly and sleeping sickness, and their agriculture collapsed (Tanner 1961).

In contrast, areas unaffected by the tsetse fly and sleeping sickness remained viable agricultural communities. In the Ukara island, agricultural intensification continued (Rounce and Thornton 1936) as induced by population increase (Boserup 1965), its geographic isolation (Gourou's siege hypothesis, 1966), and because the more humid

climate and possibilities for irrigation reduced drought-related disruptions and offered a minimum degree of environmental stability, especially of water and soil nutrient availability. Some people may have retreated from the various catastrophes into Ukara. Local WaKara agricultural practices successfully supported population densities above 300 persons per km² on rather poor granite soils with inter-cropping, manuring, and farm tools made of wood. Grains, bambarra nuts, and vegetables were grown, and the livestock was stall-fed.

5.4 Population Growth and Redistribution Since the Agroecological Recovery, 1930's - 1970's

The agroecological recovery began around the mid-1930's due to ecological, medical, demographic, economic and political factors (Ford 1971, Kjekshus 1977, Kurji 1983). Its demographic underpinnings are examined using census data since 1948 when the first modern census was carried out (Martin 1961a). The analysis shows the linkages between local and regional trends in population size and migration as mediated through spatial and temporal lags (Greenwood 1970). The analysis also suggests that the eastern Lake Victoria region is a demographic as well as an agroecological region and in which demography, environment and agroecology are interlinked in their dynamics (Kurji 1983). The main effects of the recovery were a rapid increase and redistribution of population, including much migration, into and beyond the areas of inhabitation abandoned earlier. By the early 1960's, settlements and agricultural activities were developing along some of the boundaries of the region's wildlife sanctuaries.

The recovery began ecologically when the tsetse could no longer penetrate into the highly concentrated population close to the shores of Lake Victoria. The farming activities were sufficient to keep bush thickets from regenerating and a program of bush clearing was initiated by the British in the early 1920's (Ford 1971). The increase in population was very slow and mainly after World War I; the growth rate for Tanganyika territory between 1913 and 1934 was at about 0.8% per year (Martin 1961, Gillman 1936, Koponen 1988).

After the mid-1930's, population growth accelerated and population size increased rapidly in the higher density areas of the lake basin causing population pressure and migration to less populated lands. In 1934, the population of eastern Lake Victoria (Tarime-Musoma, Maswa, Mwanza-Magu-Ukerewe, Kwimba, and Shinyanga districts) was about 1.016 million (Gillman 1936). Nearly 80.7% of it lived in the "Sukumaland" districts (Maswa, Mwanza-Magu-Ukerewe, Kwimba, Shinyanga), particularly in the lake district of Mwanza, and in the adjoining Kwimba district. The islands of Ukerewe and Ukara in Mwanza district were areas of very high density, above 300 persons per km². The average population density in Kwimba and Kwimba was about 20-40 persons per km², in Shinyanga about 15 persons per km², and in Maswa about 8 persons per km². The "Mara" districts (Tarime, Musoma Urban, Musoma Rural, Bunda and Serengeti) had about 19.3% of the regional population and a mean density of about 9 persons per km². The population was concentrated along the lakeshores of Victoria, in the hills of Ushashi and Zanaki, and in the Tarime highlands. There were minor concentrations along the Ruana-Grumeti rivers' confluence and in the Ikoma area.

During the 1934-1948 period, the population growth rate was around 1.5% per year. More confidence can be placed in the direction rather than the magnitude of change because the 1934 estimate is based on an administrative head count while the 1948 total was from a census (Martin 1961b). The most important demographic impact occurred as mortality declined with greater food availability from indigeneous agricultural development and improved famine relief in the 1940's. The virulence of earlier epidemics faded as fewer infected persons moved to spread the diseases and new medical advances in the control of rinderpest and treatment of sleeping sickness helped to protect cattle and people. By the early 1940's, cattle were being inoculated in areas where there was an outbreak of rinderpest (Ford 1971) and the increase in livestock numbers also caused people to migrate for more pastures. The cattle population of "Sukumaland" increased from about 1.25 million in 1935 to about 1.9 million around 1946.

5.4.1 The Regional and District Level Population Trends

After 1948, the population of the eastern Lake Victoria increased rapidly and by 1988 was about 2.7 times its size in 1948 (Table 5.1). It has become one of Tanzania's major concentrations of people, livestock and agricultural activity. During the 1948-88 period, the regional share of the population in the Mara districts increased while that in Sukumaland districts declined. The Mara districts had an average population growth rate of 3.1% per year as compared to 2.3% per year in the Sukumaland districts.

The general trend was a redistribution of population towards the north and east away from the higher density, long cultivated lakeshore areas and into the upland plateau and the hilly/highland ecological zones. Settlements once again expanded, eventually up to the western boundaries of the Serengeti National Park. The growth of urban centers, mainly regional and district headquarters, became most pronounced after the 1950's as their administrative, trade and industrial activities grew, and transport systems developed.

Table 5.1 Eastern Lake Victoria Region: District Populations

District	1948	1957	1967	1978	1988
Tarime	115239	145441	188536	253010	334550
Musoma	168166	234450	355589	470817	630961
Maswa	245382	292279	430916	601010	751479
Ukerewe	86424	94360	109277	138729	172893
Mwanza	190664	197341	269683	428440	564632
Kwimba	238383	242134	279739	325380	397434
Shinyanga	214101	285887	321424	430923	506329
TOTAL	1258359	1491892	1955164	2648309	3358278
Mara (Tarime, Musoma)					
TOTAL	283405	379891	544125	723827	965511
% TOTAL	22.5	25.5	27.8	27.3	28.8
Sukumaland (Maswa, Ukerewe, Mwanza, Kwimba, Shinyanga)					
TOTAL	974954	1112001	1411039	1924482	2392767
% TOTAL	77.5	74.5	72.2	72.7	71.2
Mwanza Urban			34861	100854	136990
Musoma Urban			15412	43980	68391
Mwanza Rural			234822	327586	427642
Musoma Rural			340177	424211	562570

Note: Sukumaland districts are located in Mwanza and Shinyanga regions
Source: Central Statistical Bureau (1949, 1957, 1969), Bureau of Statistics (1983, 1992)

The mean annual growth rates for districts and urban areas are shown in Table 5.2. The agroecological recovery was faster in Sukumaland where previously abandoned lands were repopulated by the end of the 1950's while in the Mara region, including Serengeti district, tsetse fly still confined cultivation in the early 1960's. During 1948-57, the higher density and long settled Kwimba, Mwanza and Ukerewe districts were areas of significant net out-migration. People initially moved from Mwanza and Kwimba districts to the Shinyanga district further south. Out-migrants from Ukerewe district settled mainly in the Musoma district to the east. In the following two decades, Maswa became an area of rapid in-migration, mainly from the Kwimba, Shinyanga, Mwanza and Ukerewe districts.

There also was considerable intra-district movement; in 1967, 55% of the district population lived outside their locality of birth (Claeson and Egero 1967). The grasslands of Maswa attracted farmers who also kept large numbers of livestock (Bantje 1989). The colonial government initiated projects for resettlement and the provision of water in the

Table 5.2 Eastern Lake Victoria Region: District Population Growth Rates (% per year)

District	1948-1957	1957-1967	1967-1978	1978-1988
Tarime	2.6	2.6	2.7	2.8
Musoma	3.8	4.3	2.6	3.0
Maswa	2.0	4.0	3.1	2.3
Ukerewe	1.0	1.5	2.2	2.2
Mwanza	0.4	3.2	4.3	2.8
Kwimba	0.2	1.5	1.4	2.0
Shinyanga	3.3	1.2	2.7	1.6
TOTAL	1.9	2.7	2.8	2.4
Mara (Tarime, Musoma) Districts	3.3	3.7	2.6	2.9
Sukumaland (Maswa, Ukerewe, Mwanza, Kwimba, Shinyanga) Districts	1.5	2.4	2.9	2.2
Mwanza Urban			10.1	3.1
Musoma Urban			10.0	4.5
Mwanza Rural			3.1	2.7
Musoma Rural			2.0	2.9

Source: Calculated from Table 5.1 data

district through the Sukumaland Development Scheme to reduce growing population pressure closer to the lakeshores. Mwanza district had considerable out-migration during 1948-1957 period but became an area of in-migration during 1957-1978 because of the urbanization of Mwanza city. It became Tanzania's second largest urban centre. The city and surrounding Mwanza rural district also attracted in-migrants from neighbouring regions and immigrants from Kenya, Uganda and Rwanda-Burundi (Cleason and Egero 1973, Mlay 1983).

The cultivation of cotton as a cash crop was vigorously promoted in Sukumaland during the 1950's and it also contributed, with food production, to the rapid expansion of the acreage being farmed. An important policy conundrum for the colonial authority was choosing between government-directed, or spontaneous population movements and settlements (Malcolm 1953). It viewed uncontrolled native settlements as a source of further ecological degradation and uneconomic land use. This concern was heightened by the rapid population growth, high densities and increasing signs of range degradation. The cattle population of Sukumaland collapsed from about 1.9 million around 1946 to about 1.25 million around 1953 and then increased again to about 2 million in 1960 (Ford 1971).

In the Mara region, the pattern of settlement around 1950 was quite similar to that in the mid-1930's (Gillman 1936). The population of Musoma district was distributed in a gradient of rapidly decreasing density from the lakeshores towards the boundaries of the Serengeti National Park in the east. Musoma district had consistently high population growth rates in the 1948-88 period with significant in-migration during 1948-67 from Ukerewe, Tarime Mwanza and Maswa districts as well as Kenyan immigrants (Tanner 1961). In the Tarime district, the population was distributed more evenly than in Musoma district with concentrations along the lakeshores in the west and also in the highlands to the east. The cooler highlands were much less suitable for tsetse and the higher, more even distribution of people along with the absence of a large wildlife population reduced the impact of sleeping sickness in the district. Population trends in the Tarime district as a whole did not vary as much as in the areas of ample land and net in-migration like Musoma or Maswa. Instead, Tarime district had sustained, slow out-migration while also

being settled by in-migrants from the Musoma district and Kenyan immigrants.

In both the Musoma and Tarime districts, some of the high density areas (e.g. Majita peninsula and Tarime highlands) had complex land use and land tenure systems. But the expansion of settlements from these crowded areas was often obstructed by tsetse infested bushland as in the case of Majita peninsula (Tanner 1961) or by drier climates, poorer soils and other ethnic groups as in the case of the Tarime highlands. The Serengeti National Park also became a barrier to settlement expansion.

5.4.2 The Sub-District Level Population Trends

The census 'division' (*tarafa*) is the only spatial unit for which population data can be reliably compiled to examine the sub-district population trends during 1957-88. The 'division' was used to tabulate 1967 population data within districts (Central Statistical Bureau 1969). Thomas (1971) has estimated the 1957 populations of divisions. The divisional boundaries (LZP 1980) were used to compile their respective populations in 1978 and 1988. Other information on sub-district population included Tanner's (1961) surveys in Musoma district, and the 1962 population distribution map for East Africa by Porter.

The analysis of division-level populations focused on Musoma and Tarime districts for two main reasons: first, the Serengeti district originally was the eastern portion of the Musoma district before 1973 and consists of the Rogoro division and the eastern half of the Mara division; and, secondly, most of the in-migration into the Serengeti district was from the Tarime highland divisions (Inchugu, Inchage, Ingwe).

The divisions in each district were divided into three major ecological groups as follows: (i) the upland lake shores in the west, (ii) the upland plateau of the central areas of districts, and (iii) hilly/highlands in the east. During the 1957-1988 period, there was a redistribution of population away from the lakeshore areas and towards the upland plateau in the central portions and the hilly/highlands to the east (Table 5.3).

In Musoma district, the 1957 census indicated that almost 69% of the total population lived in the lakeshore divisions within 50km of the shores of Lake Victoria. These

divisions accounted for 34% of the district area. The Mara and Serengeti divisions in the central parts of the district had about 27% of the population and another 34% of the area. The Rogoro division (most of present Serengeti district) accounted for 32% of the area but only 4% of the district population. By 1988, about 53% of the total population was within 50 km of the lakeshores, the central portions had about 31%, and Rogoro division's share had increased to 15.6 %.

The population of Tarime district was also redistributed towards the hilly/highland (> 1500m) divisions; they had 29% of the district population in 1957 and 44% by 1988. These divisions accounted for 34% of the district's area. The lakeshore divisions, with 36% of district area, did not change much in their relative share of the district population over time. The central divisions with 30% of area had significantly lost their share of the district population between 1957-1988. In 1957, the area had 42% of the population but

Table 5.3 Divisional Populations: Musoma and Tarime Districts, 1957 - 1988

Division	Area(km ²)	1957	1967	1978	1988
MUSOMA DISTRICT (includes Musoma, Bunda, Serengeti districts)					
Nansimo(L)	295.0	16000	27132	31514	39488
Nyanja(L)	1195.8	57000	68810	79709	106177
Kenkomboyo(L)	415.6	11000	21697	24374	35229
Makangoro(L)	1606.5	74000	76043	91069	119845
Serengeti(U)	2028.3	38000	68022	89625	126600
Mara(U)	1433.8	23000	36340	39081	47851
Rogoro(H)	3342.3	9000	42133	71452	87680
Total	10317.3	228000	340177	426824	562870
TARIME DISTRICT					
Suba(L)	609.8	18000	19580	23242	32123
Nyamagaro(L)	52.0	7000	5075	6565	8575
Kiseru(L)	631.9	17000	39207	49523	60500
Luo-Imbo(U)	236.4	7000	13372	15609	18490
Girango(U)	494.9	33000	32555	36315	45369
Inano(U)	373.8	21000	14722	19521	19797
Inchugu(H)	234.4	16000	12430	18997	31350
Inchage(H)	377.5	12000	23944	41471	58269
Ingwe(H)	619.5	14000	27651	41767	60077
Total	3630.2	145000	188536	253010	334550

Note: L=lakeshores U=upland plateau H=hills/highland
Source: 1957 data from Thomas (1971), 1967 data from CSB (1969), 1978 and 1988 data compiled from Bureau of Statistics (1983, 1992)

in 1988, it was only 25%.

The spatial differences in population density also changed between 1957-1988 and the density gradient became less steep. In 1957, the lakeshore areas of Musoma district had average densities that were 2.5 times higher than in the central divisions and about 16 times the density in the Rogoro division (Table 5.4). By 1988, the lake shores had densities only about 3.5 times as much as in the Rogoro division. In Tarime district, population densities in the highlands in 1988 were more than twice larger than in 1957; that of the central divisions increased by about 170%. In the lakeshore areas, densities increased only by 30% during the 1957-1988 period. Nyamagaro division remained an enclave of persistent high density, almost five times the average in the rest of the lakeshores. The reasons for this require additional study.

Table 5.4 Divisional Densities and Population Growth Rates: Musoma and Tarime Districts, 1957-1988

MUSOMA DISTRICT Division	1957	1957-67	1967	1967-78	1978	1978-88
Nansimo(L)	54.2	5.4	92.0	1.4	106.8	2.3
Nyanja(L)	47.7	4.1	57.5	2.1	66.7	2.8
Kenkomboyo(L)	26.5	7.0	52.5	1.1	58.6	3.8
Makongoro(L)	46.1	0.3	47.3	1.7	56.7	2.8
Serengeti(U)	18.7	6.0	33.5	2.5	44.2	3.5
Mara(U)	16.0	4.7	25.3	0.7	27.3	2.0
Rogoro(H)	2.7	16.7	12.6	4.9	21.4	2.1
Total	22.1	4.1	33.0	2.1	41.4	2.8
TARIME DISTRICT Division	1957	1957-67	1967	1967-78	1978	1978-88
Suba(L)	29.5	0.8	32.1	1.6	38.1	3.3
Nyamagaro(L)	134.6	-3.2	97.6	2.4	126.3	2.7
Kiseru(L)	26.9	8.7	62.0	2.1	78.4	2.0
Luo-Imbo(U)	29.6	6.7	56.6	1.4	66.0	1.7
Girango(U)	66.7	-0.1	65.8	1.0	73.4	2.3
Inano(U)	56.2	-3.5	39.4	2.6	52.2	0.0
Inchugu(H)	68.3	-2.5	53.0	3.9	81.0	5.1
Inchage(H)	31.8	7.2	63.4	5.1	109.9	3.5
Ingwe(H)	22.6	7.0	44.6	3.8	67.4	3.7
Total	39.9	2.7	51.9	2.7	69.7	2.8

Note: L=lakeshores U=upland plateau H=hills/highland
Densities in persons per km²
Source: Calculated from Table 5.3

The divisional population growth rates suggested that there was net in-migration into the lakeshore divisions of Kenkomboyo, Nansimo and Nyanja during 1957-67. Their population growth rates were considerably higher than the rate of natural increase in the district. Some of this in-migration was from the densely settled islands of Ukerewe and Ukara, and also from Tarime district and Kenya (Tanner 1961). The Serengeti and Mara divisions further east also had much in-migration during 1957-67. These results confirm Tanner (1961) who noted rapid population increase in the Ushashi area (of Serengeti division); more than a third of the growth was from WaSukuma in-migration. The emergence of WaSukuma in-migration was one of the regional consequences of the faster and earlier agroecological recovery in Sukumaland (Kurji 1983). The population of the Ngoreme-Kiagata area (Mara division) more than doubled between 1955-1959 (Tanner 1961). About 15% of the total population of the Ngoreme-Kiagata area was from Tarime district and Kenya. The settlements were concentrated along the footslopes of the several hill blocks of the area while much of the lower lying land adjacent to the Mara valley was almost unsettled. Makangoro division was the only area of net out-migration during 1957-67. The population of Zanaki (in Makangoro division) decreased by 14% over the 1955-59 period even though the area had good agricultural potential (Tanner 1961). Overall, the 1967 census indicated that about 58% of the residents of the Musoma district (includes Bunda, Serengeti, Musoma Rural and Urban districts) lived outside their locality of birth: 10% of the population were in-migrants from "Sukumaland" districts, especially from the Ukerewe, Magu, Bariadi and Maswa; 40% had moved within the district or were from Tarime district; and 8% were immigrants, mainly from Kenya (Claeson and Egero 1973).

In the 1967-78 decade, the demographic trends changed significantly. All the divisions of Musoma district except Rogoro experienced net out-migration. They had growth rates 20%-80% lower than Mara region's average rate of natural increase of 3.1% per annum (Mbaruku 1983). Only Rogoro division had a trend of rapid net in-migration during the 1957-78 period with growth rates significantly higher than the rate of natural increase. Musoma town grew at a rate of 10% per year during 1967-78 and the rate decreased to 4.5% per year in 1978-88.

The population growth in the highlands of Tarime district continued from the result of two combined factors: the higher rate of natural increase in the Tarime highlands as compared to the upland lakeshores and plateau; and, the urbanization of the district headquarter at Tarime town in Inchage division that drew people from all over the district. People may also have moved to settle near the Tanzania-Kenya frontier to engage in cross-border trade, legal or otherwise. A higher rate of natural increase in the highlands is suggested by differential child-woman ratios (0-4 yr)/women (15-54 yr): in 1978, the ratio for the highlands was 937 per 1000 women while that for the lower areas of the district was 748 per 1000 women.

The divisional census data indicated that the population of Rogoro increased from 9,000 persons in 1957 to over 71,000 in 1978 at an average growth rate of 10.4% per year. Such a growth rate would suggest a net in-migration rate of 29% per annum for the period. The demographic trends and impacts of migration varied within the Rogoro division. A population dot map based on the 1948 census indicated that total population in the Ikoma, Issenye and Natta areas of southern Rogoro division was less than 15,000 persons (Handbook of Natural Resources of East Africa 1961). The population was slowly decreasing during the mid to late 1950's because of out-migration from its dry, tsetse infested habitats and abundant wildlife. Tanner (1961:166) observed that in Ikoma "the population reduction has been so marked that the cultivated land and the land cleared by grazing and firewood collection can no longer keep clear sufficient areas to balance the surrounding tsetse bush with the needs of the mixed farming".

The net in-migration into Rogoro division must therefore have been in the northern portion of the division, principally in Mugumu rural and urban wards. Tanner (1961) did not survey the Mugumu areas, perhaps because the in-migration from the Tarime district became noticeable only in the 1960's. The 1991 village survey indicated that nearly all the villages of the Mugumu rural ward were established during the 1950's but their scattered and small populations may not have been obvious and accessible for study. This in-migration was mainly associated with demographic trends in the Tarime highlands that are mainly settled by the WaKuria peoples. The village survey in 1991 also showed that the WaKuria residents of Serengeti district are mainly from the WaKira, Nyabasi and

Abarenchoka clans whose respective totem symbols (Tobisson 1986) are Inchugu (elephant), Inchage (zebra), and Ingwe (leopard). These represent names of divisions in Tarime highlands and sources of in-migrants into Serengeti district.

The agriculture of the Tarime highlands intensified and expanded as the population grew and new cash crops, e.g. maize, became popular (Tobisson 1986). The WaKuria began to move out of the Inchugu and Inano divisions towards the southeast into the Ingwe division of Tarime district, and into the Mugumu wards (mainly highland portion of the Rogoro division of Serengeti district). Both the Ingwe and Rogoro divisions abut the Serengeti park. The Inchugu and Inano divisions of Tarime district had significant out-migration while the Inchage and Ingwe divisions showed net in-migration during the 1957-67 period. While the movement into Inchage was also associated with the urbanization of Tarime town, the in-migration into Ingwe, and into Mugumu areas of Rogoro was principally for land.

5.4.3 The Post-'Villagization' Population Trends

The 'villagization' of scattered homesteads into Ujamaa-development villages during 1973-74 appeared to have been an important divide in the trends and patterns of population change in the eastern Lake Victoria region. It seemed to have reduced the role of migration as a factor in population change, at the regional, district and local levels. Post-villagization population growth rates were not as pronounced as the pre-villagization growth rates (Table 5.2). More areas of the eastern Lake Victoria region grew at average rates closer to the rate of natural increase, about 3.0% (Mbaruku 1983, Bureau of Statistics 1992). The rates of urbanization of Mwanza city and Musoma town, the largest urban concentrations of eastern Lake Victoria, also declined significantly from around 10% per year in the 1967-78 period and to about 3-4.5% per year in the 1978-88 period. These growth rates almost equalled or were some 60% higher than the rate of natural increase.

But the generally reduced role of migration continued to be a significant factor in the regional population dynamics. Since the 1970's, the "Sukumaland" districts east of Lake Victoria have become areas of net out-migration, not withstanding the continued

urbanization of Mwanza city and other smaller urban centres. The "Sukumaland" growth rate in the 1978-88 period declined to 2.2% per year from 2.9% per year in the 1967-78 period. The regional locus of migration changed: the trend of movements to the north and east during the agroecological recovery switched towards the Geita and Kahama areas south west of Lake Victoria, and to the Tabora and Rukwa regions in the post-villagization period. Population growth in Kahama district averaged about 6% per year, and 3.4% per year in Geita district between 1967-88. The availability of land and gold diggings were among the factors that attracted people. This in-migration appeared to be from the Ukerewe, Mwanza, Kwimba and especially the Shinyanga district where out-migration increased by more than a half of the rate during 1967-78.

The demographic trends for districts varied. The trends within districts also varied, as indicated by ward level population changes. The 1978 and 1988 census data could be examined at ward level, a spatial unit smaller in size than the division. Maswa, a district that drew many in-migrants during 1957-78, became an area of net out-migration. But this out-migration was most rapid from the south of the Maswa Game Reserve and the area was being depopulated quickly (Figures 5.3 & 5.4). Other areas of less heavy out-migration included the southern and northern margins of the Maswa district and the western half of the Bariadi district. The Dutwa plains, also used extensively by wildlife, are included in this area of out-migration and slow depopulation. In contrast, the central and eastern portions of the Maswa district and the eastern half of the Bariadi district were areas of some net in-migration, at rates around the rate of natural increase (assumed at 2.8% per year; Mbaruku 1983, Bantje 1993). Ukerewe remained an area of sustained out-migration and was relatively unaffected by the little amount of 'villagization' during 1973-74 in its concentrated population.

The trends in the Mara districts also indicated a reduced role of migration, more than in the Sukumaland further south. There was a decline, since 1967, in the proportions of the extra-regional and immigrant populations of Mara region. In 1967, about 85% of the regional population was born within as compared to 91% in 1978 and 90% in 1988 (Claeson and Egero 1973, Mlay 1983, Bureau of Statistics 1992). In 1967, about 9% of Mara's residents were from outside Tanzania but this proportion declined to 2% in 1978

Figure 5.3 Ward Level Population Growth Rates (% per Year), 1978-1988:
Eastern Lake Victoria Region, Tanzania

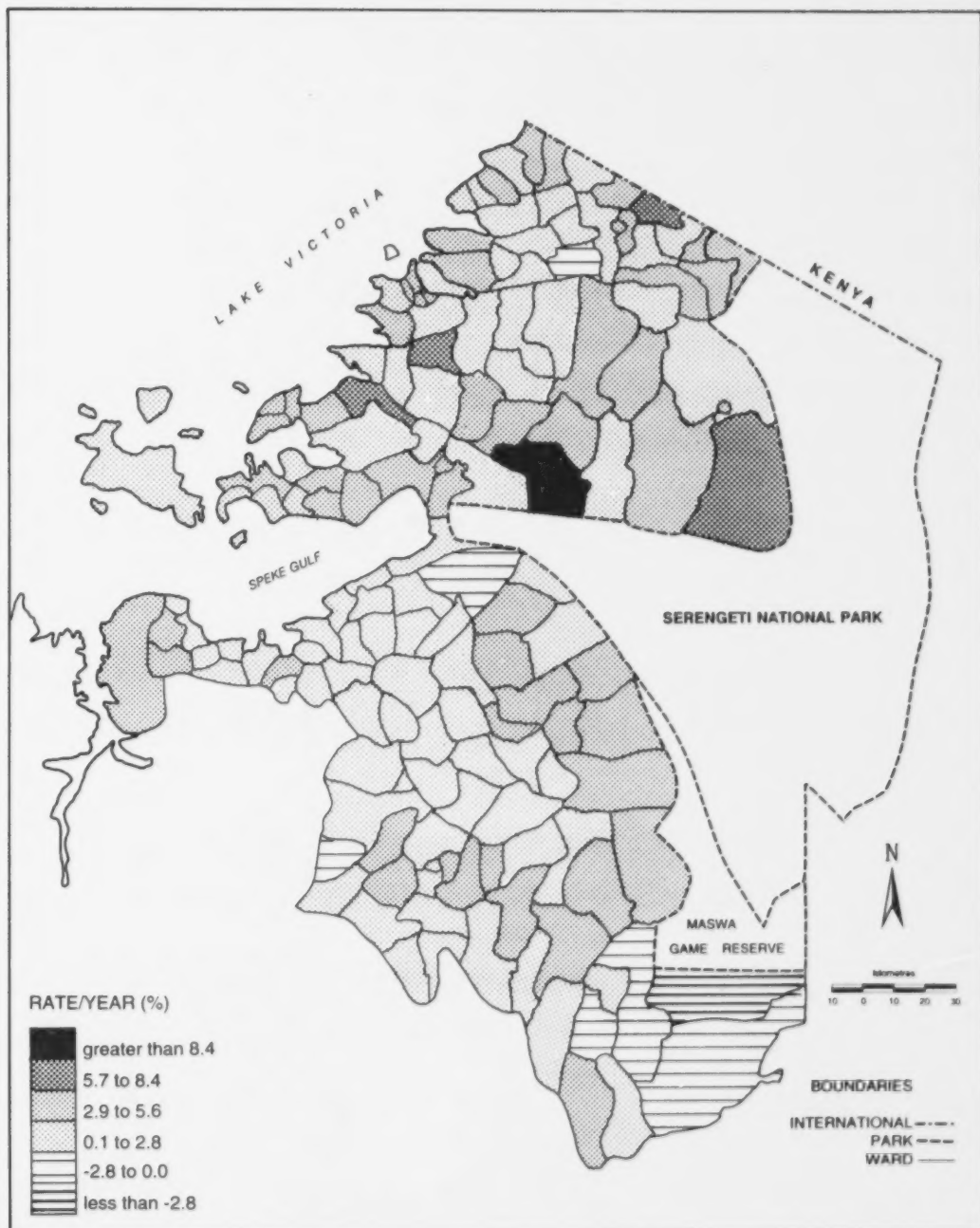
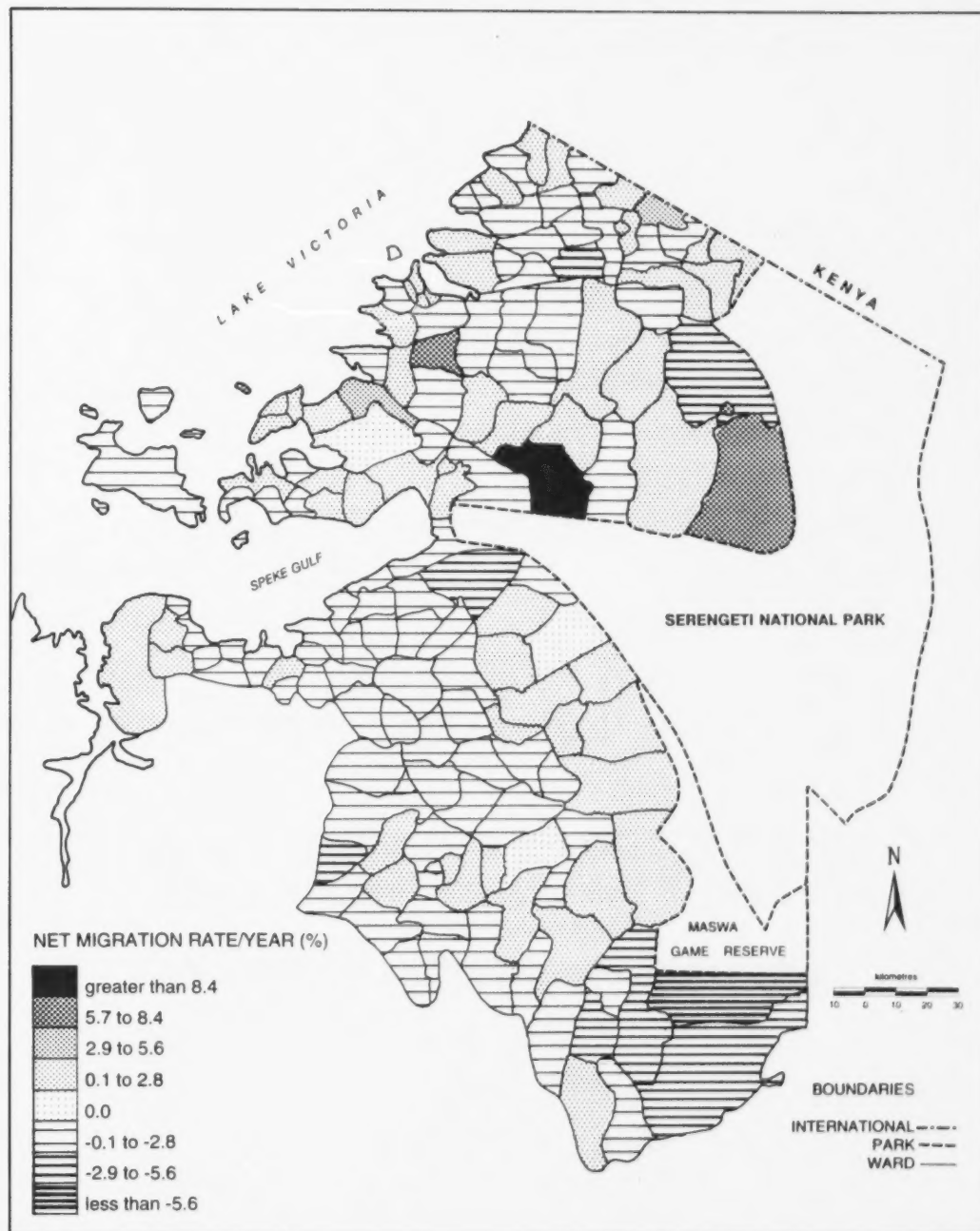


Figure 5.4 Ward Level Net Migration Rates (% per Year), 1978-1988:
Eastern Lake Victoria Region, Tanzania



and then to 1.6 % in 1988. The trend suggested a decrease in extra-regional in-migration and immigration into Mara region since 1967 and/or an out-flow from the region of those born elsewhere after a period of residence in Mara. The 1978 census data indicated that extra-regional in-migrants were primarily from the Mwanza region (WaSukuma mainly) and some from West Lake region (Mlay 1983). Out-migration from Mara region to other areas also declined. Between 1967-1978, out-migrants from Mara region went mainly to Mwanza region, others moved to Dodoma and West Lake regions. Some Kenyan born migrants may have returned to their country of origin at the time of 'villagization' in 1973-74.

The population trends within the Musoma and Tarime districts after 'villagization' varied as well. During 1978-88, the rates of growth of Musoma and Tarime towns declined substantially although in-migration continued. The pre-villagization trend of net out-migration from the lakeshore areas also slowed down considerably (Figures 5.3 & 5.4). Their growth rates in the 1978-88 period almost equalled the rate of natural increase. Out-migration continued from the upland plateau areas of the Tarime district and the western portions of the upland plateau of Musoma Rural district.

In contrast, the eastern margins of the Bunda district, e.g. Mugeta and Nyamuswa wards became areas of in-migration at rates that were greater or equal to the natural increase. Bunda town and its surrounding rural ward also grew rapidly with about half the increase being from in-migration. Hunyari ward had the highest in-migration with an annual population growth rate above 8.4% during 1978-88. This growth was mainly in the Ruwana plains which are extensively used by the topi and wildebeest populations of the Serengeti National Park (Duncan 1975).

In the hills/highlands of Tarime district population growth was most rapid in the Pemba ward of the Inchugu division and the rate of in-migration was about the rate of natural increase (Figures 5.3 & 5.4). The wards of the Ingwe division abutting the Serengeti National Park were areas of some net in-migration, at rates less than half the natural increase. In the Inchage division, the in-migration was into Tarime town and some villages of the adjacent Turwa ward.

In the Serengeti district, the Kisaka and Issenye wards in the upland plateau became areas of slow net out-migration, at rates upto that from natural increase (Figures 5.3 & 5.4, Appendix I). The Mugumu rural ward had the heaviest net out-migration and at a rate perhaps equal to natural increase (assumed at 2.8% per year). This ward comprises mainly of the hills/highlands with greater and more reliable rainfall, and more fertile soils. In contrast, the population of Mugumu town grew from net in-migration and natural increase while the Ikoma ward had the highest population growth during 1978-88. The rate of in-migration was almost 1.5 times the rate of natural increase. Most of the in-migration was in villages at the margins of the hills/highlands, e.g. Miseke, Keksongo, Bwitengi, and Romchanga.

The preceding analysis has outlined the spatial and temporal trends in population growth and redistribution and demonstrated the linkages, as mediated through lags, between the regional and local level demographic changes in the eastern Lake Victoria region. However, it was not possible to use the census data to specifically determine the types of migrants, delineate their migration fields (Hägerstrand 1957), assess the extent of lifetime mobility of people, and the distances moved by people. Data from the 1991 sample surveys of villages and households in Serengeti district were used to examine types of migrants, migration fields, lifetime mobility of people, and the average distances moved by people.

5.5.1 Types of Migrants: Serengeti District

The field surveys yielded a sample of 1243 persons. Less than a third of them had not had moved during their lifetime and lived in their birthplace at the time of the surveys (Table 5.5). The sample proportion of non-movers was lower than 42% of Musoma district population enumerated in the 1967 census (Claeson and Egero 1973; Table 4.9). The result confirmed the expected higher mobility among the residents of Serengeti district as indicated earlier by the analysis of the census data. Most of the people were primary migrants (first time movers) while the proportion of repeat migrants was slightly greater than those who had never moved during their lifetime. Return migrants accounted for about 7.1% of the total sample population, including those who

returned to their birthplace and those who returned to a location of previous domicile which was not their birthplace.

Table 5.5 Types of Migrants: Serengeti District

Migrant Type	N	%	Migrant Type	N	%
No Move	374	30.1	Unknown	58	4.7
Primary	419	33.7	Repeat	304	24.5
Return to Birthplace	46	3.7	Return but Not to Birthplace	42	3.4

Source: Household Survey, 1991.

Some migrations were quite complicated and involved multiple return and repeat movements, e.g. a person who was born in Nyamburi village of the Serengeti district, moved to Mpanda area in southwest of Tanzania, then returned to his birthplace with a family, once again went back to Mpanda, and finally, returned to Serengeti district to settle in Mrenga village.

Mobility and education have been often hypothesised as being associated (Connell et al. 1976). The expectation is that rural people with higher education may have more and better opportunities elsewhere which could be realized by moving (Sabot 1972). People may also move to obtain an education if it is valued and if there are the means among rural families to support the schooling of their children (Connell et al. 1976). But, migration selectivity can also be associated with a lack of schooling as well as among those with a higher level of education. The usual context of the analysis of migration-education relationship has been in rural-urban rather than in intra-rural movements.

In Serengeti district, the level of schooling of non-movers and migrants of different types did not differ significantly (Table 5.6; Bartlett's $\chi^2=74.8$, $df=4$, $p<0.001$; $F=0.172$, $df=4$, 899, $p=0.953$). Since children generally went to school from the age of 7 years, those under this age were excluded from the analysis. However, persons with more than primary education (above 7 years of schooling) had made significantly more lifetime moves than those who did not complete primary education or had never been to school. Consequently, the specification of the mobility-education hypothesis is important

in analysing their inter-relationship.

**Table 5.6 Levels of Schooling, Migrant Types, and Total Lifetime Moves:
Serengeti District, 1991**

Migrant Type	N	Mean Schooling (yrs)	Std. Dev.
Not Moved	187	4.1	10.3
Primary	344	4.7	13.0
Repeat	286	4.9	13.0
Return to Birthplace	46	5.0	14.6
Return to Other Place	41	4.0	3.8
Schooling Category	N	Av. Moves	Std. Dev
None	299	1.8	0.94
1-6 yrs	193	1.8	1.14
Primary	188	1.9	1.19
More than Primary	33	3.0	2.43

Source: Household Survey, 1991.

5.5.2 Migration Fields: Serengeti District Population

According to Cadwallader (1992:45), "a migration field refers to the overall pattern of flows associated with a particular place" and "An in-migration field is thus a functional, or nodal, region that delineates the origins of immigrants to an area, while an out-migration field characterizes the destinations of emigrants from that area".

Historically, the migration fields for the peoples of Serengeti district have been continental, regional and inter-district as well as local. The survey data were on movements of the district residents in the past eighty years, about the highest likely age of a living resident. The locality of the first lifetime movement of 21 persons of the sample population could not be identified. Among the rest of migrants, 39.4% moved within the Serengeti district (Table 5.7). The migration fields were delineated on the basis of previous residence of a person in a specified locality but were inhabitants of Serengeti district at the time of the survey.

Most of the movements into and from the Serengeti district were within the neighbouring districts, especially of the Mara region (Tarime, Bunda, Musoma) and the

Sukumaland districts, especially Bariadi and Magu. The category 'Usukuma' comprised of the Shinyanga, Kwimba and Geita districts. People from other regions of Tanzania, outside the eastern Lake Victoria zone, were an important component of the in-migration while relatively few Serengeti born people went out to reside in other regions of Tanzania and then returned to the district. A larger proportion of the immigration field of Serengeti residents comprised of emigrants from the district to Kenya and the subsequent returnees to the district. The results confirmed the predominance of within district and intra-regional movements in Tanzanian internal migration (Claeson and Egero 1973).

Table 5.7 Migration Fields of A Sample of Serengeti Residents

(i) In-Migration and Immigration Field					
Locality	%	Locality	%	Locality	%
Tarime	14.4	Bunda	11.8	Musoma	2.3
Bariadi	4.2	Magu	2.8	Mwanza	1.7
Maswa	1.0	Ukerewe	0.1	'Usukuma'	1.1
Other Region	2.2	Other Country (Kenya)			1.9
(ii) Out-migration and Emigration Field					
Locality	%	Locality	%	Locality	%
Bunda	2.2	Tarime	0.9	Musoma	0.2
'Usukuma'	0.3	Bariadi	0.2		
Other Region	0.2	Other Country (Kenya)			0.9

Source: Household Survey, 1991.

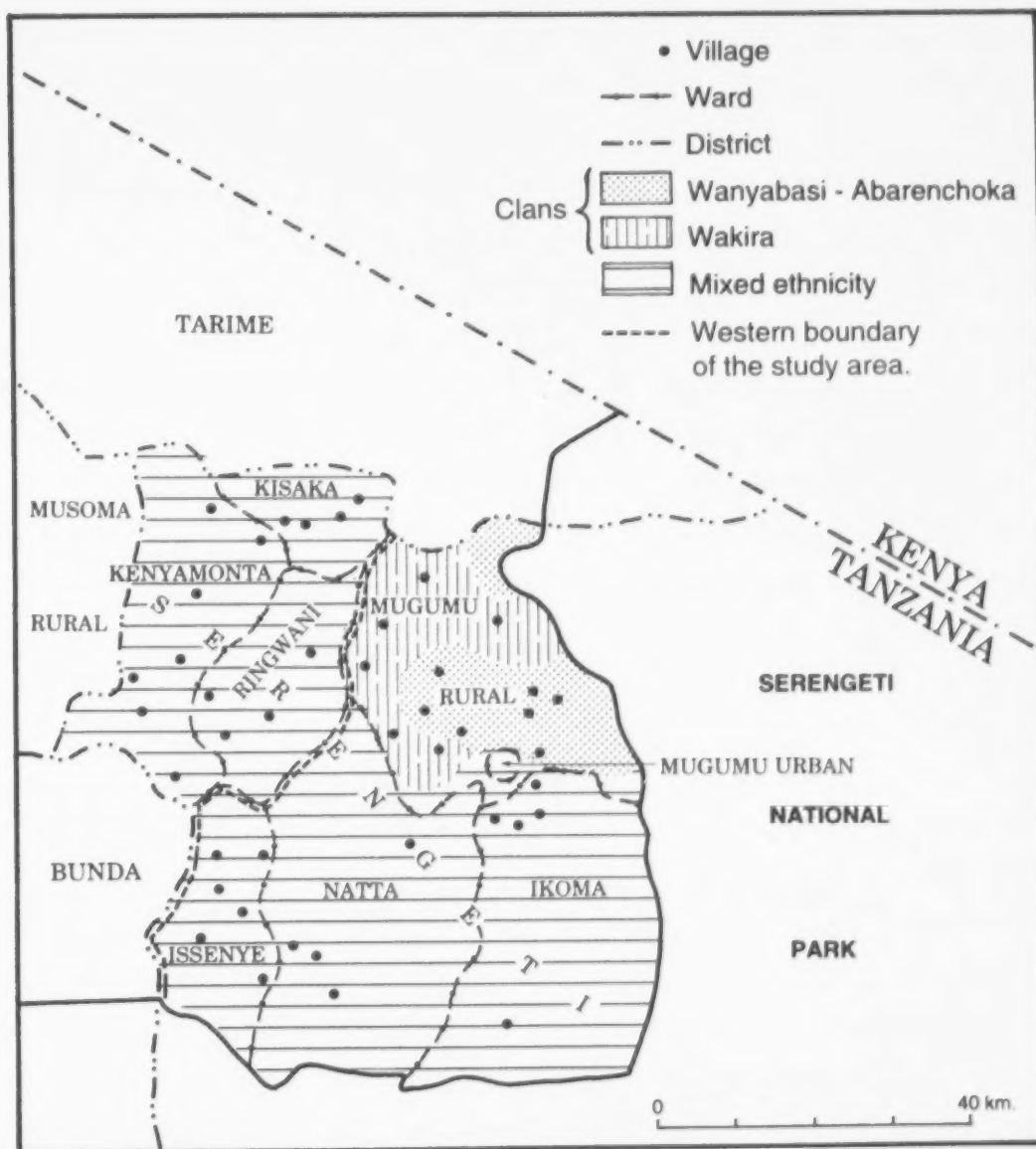
Data from the village and household surveys of 1991 also indicated three main types of migration fields within the Serengeti district. The north eastern portion of Serengeti district settled mainly by the Kuria peoples had two distinct migration fields based on clan territories (Tobisson 1986). These are the WaNyabasi-Abarenchoka, and WaKira migration fields. The clan (ukoo) is defined on the basis of blood relations. The WaNyabasi and Abarenchoka will not currently request residence in WaKira villages and likewise, WaKira will not seek to reside in Nyabasi and Renchoka villages.

The exclusively WaNyabasi migration field included eight villages (Figure 5.5). In addition, the Abarenchoka e.g. in Mrenga, are considered as allied to the WaNyabasi and people from these clans will co-reside and may migrate between their villages. Between 1978-88, the population of this migration field grew at an average rate of 1.1% per year and there was a net loss of population (Net Migration Rate of -2.1% per year). The out-migration was perhaps to Mugumu urban but most likely to the Inchage areas of Tarime highlands, especially the Tarime urban and Turwa wards. The clan totem symbol of the WaNyabasi is inchage (zebra) and that of the Abarenchoka is ingwe (leopard). During 1978-88, the proportion of people above 54 years in age slightly declined from 6.6% to 6.2%, the proportion of adult females (15-54 years) increased slightly from 22.5 to 23.5, while the adult sex ratio (15-54 years) of 73 males per 100 females remained unchanged.

The second major migration field among the WaKuria was the exclusively WaKira clan migration field and comprised of five villages (Figure 5.5). The total population of this field grew at a rate of - 1.9% per year in the 1978-88 period and there was a net out-migration rate of - 4.9% per year. The population of Mrenga, though allied to the WaNyabasi, was included in this field because the 1978 census data for Machochwe included Merenga as well. This net loss of people was perhaps to Mugumu urban but more likely to the Inchugu division of Tarime highland, particularly to the Pemba ward which had significant in-migration during the 1978-88 period. The clan totem symbol of the WaKira is inchugu (elephant). During 1978-88, the proportion of people above 54 years declined slightly from 7% to 6.3%, the proportion of adult females (15-54 years) declined from 28.8% to 24%, while the adult sex ratio was almost unchanged, from 78 to 77 males per 100 females (15-54 years).

The third type of migration field had mixed ethnicity, in varying proportions. This migration field comprised the villages of the north western and southern portions of the Serengeti district as well as the district headquarter at Mugumu town. The villages of the north east were predominantly inhabited by the Ngoreme peoples who also have clans. The population of these villages grew at an average rate of 2.8%, about the rate of natural increase, during 1978-88 and thus had no net migration. Mugumu urban population had significant net in-migration during the inter-censal period, at a rate of

Figure 5.5 Ethnic Areas and Migration Fields: Serengeti District



3.3% per annum in addition to the natural increase. The 19 villages of southern Serengeti with mixed ethnicity had net in-migration at a rate of 1% per year, while the overall population growth rate was 3.6% per year. There was a decline in the proportion of population above the age of 54 years in the inter-censal period (1978-88) from 11% to 9.7%, while the adult sex ratio did not change (82 and 81), and the proportion of adult females in the population also remained almost unaltered (23.1% to 23%).

Ethnicity has been recognized as an important factor in African migrations but much of this analysis has been focused on the movements of 'language-production' groups, e.g. Bantu, Cushities, etc. (Koponen 1988), or usually, 'tribes' (Hirst 1970, Martin 1961a, 1961b). The above results have indicated that sub-tribal units such as clans were significant in influencing the choice of migration destinations, especially where the clan-territory was an important organizing principle of social and spatial interaction.

The role of clans in migration is not peculiar to African peoples such as the WaKuria. Mandal (1981a) also found the migration of clan groups to be a significant feature of settlement development in rural North Bihar (India). Clan-territories are an example of over-lapping, interactive 'social' and 'spatial' units affecting migration processes, legitimated by affinity and extending to ancestral sources of migration. As a socio-spatial unit, they allow a study of "the perceptible and simultaneous shifts in both spatial and social locus ...in tandem" arising out of migration (Zelinsky 1971:224).

The socio-political strife in the Serengeti district since 1985 appeared to have reinforced the importance of ethnicity as a factor, even overriding in some areas, in the population movements within the district. This situation contrasts the post-villagization to 1985 period during which peoples of varying ethnic and clan affinities co-resided and movement between villages was much less ethnically determined. A successful and rapid resolution of inter-clan and other ethnic conflicts will be critical factors in dealing with the issues of providing adequate land, other resources, and security as the population of Serengeti district increases rapidly, especially in the hilly and highland areas.

5.5.3 Lifetime Mobility of A Sample of Serengeti Residents

Census data provide a cross-sectional view about a population at a particular time and generally underestimate total migration because such data fail to include all the intervening moves made in the period between places of birth and enumeration at a particular date (Lewis 1982). Residence history (Pryor 1979) data for the sample of Serengeti households were used to assess the frequency of migratory movements made by people during their lifetime. A migratory move was defined as having occurred when a person or household established residence in a location by building or occupying a homestead. This assessment also provides a means of gauging the extent of changes in social and agroecological locus made by individuals and households and to which they have to adjust because of migration, i.e. changes in spatial locus.

Residents of Serengeti district are mobile rather than sedentary rural dwellers (Table 5.8). The maximum number of lifetime migratory moves recorded was 12 but the majority of people had undertaken at least one move during their lifetime. Males and females did not differ significantly in the average number of lifetime moves made ($t=0.748$, $p=0.455$).

Table 5.8 Number of Lifetime Moves: Serengeti Population

Moves	N	%	Moves	N	%
0	374	31.9	1	419	35.7
2	217	18.5	3	97	8.3
4	41	3.5	5 or more	26	2.2

Source: Household Survey, 1991.

Children under the age of 15 years were the least mobile segment of the population while the proportion of population that had not moved decreased with age until age 54 years (Table 5.9). The ages and the lifetime movement data for 62 persons could not be established and were excluded from the analysis. Overall, most people made several moves during their lifetime, as has been suggested by Zelinsky (1971).

Table 5.9 Population Not Moved By Age Cohorts: Serengeti District

Cohort	Total	Not Moved	%
<15 yrs	566	298	52.7
15-24	259	56	21.6
25-34	128	8	6.3
35-44	73	4	5.5
45-54	58	1	1.7
55> yrs	97	7	7.2
Total	1181	374	31.7

Source: Household Survey, 1991.

The average number of lifetime moves for specific age cohorts are shown in Table 5.10. The averages are shown for the total population as well as for the population that had made at least one move during the lifetime. The average number of moves made by the population increased with age, was maximum for the 35-44 year cohort and then declined once again. The highest relative increases in mobility for an additional year in age were between the ages 15-34 and after which the relative mobility actually began to decline.

Few studies have been undertaken on residence analysis in rural communities of the developing world but the observed trends from this Serengeti study are in general agreement with Bogue (1969:793) who concluded that "Persons in their late teens, twenties, and early thirties are much more mobile than younger or older persons". Taeuber et al. (1961) noted in their American study that relatively few people moved between birth and adolescence, there was significantly greater migration in the late twenties, and then a decline in the potential of a person to migrate (Lewis 1982).

Migration among Serengeti's rural residents appeared not to be closely tied to rites of passage and marriage of males but more likely to the foundation and increase in family size and the need for land, social ties, and security. Indeed, in areas where village land is in short supply, relative mobility may be highest after children born in a family are in late adolescence and early teens and the demand for land prompted a move for land;

Table 5.10 Average Lifetime Moves For Age Cohorts: Serengeti District

Cohort	Total Population			Population that Moved		
	Total	N	Av.	Total	N	Av.
0-14	357	566	0.63	357	268	1.33
15-24	355	255	1.39	355	199	1.78
25-34	254	126	2.01	254	118	2.15
35-44	166	73	2.27	166	69	2.41
45-54	131	58	2.26	131	57	2.30
55>	194	96	2.02	194	89	2.18
Total	1457	1174	1.24	1457	800	1.82

Source: Household Survey, 1991.

after the move, the increasing family labour (as children became older) would prompt the family to become relatively sedentary and concentrate, instead, on farming the land owned. In villages where land was still available, households would expand their cultivation as the household size increased unless there was a drastic decline in soil fertility or other social, psychological or ecological reasons compelled a migration. Thus, the relatively high late teen movement was a consequence of passive migration (Hägerstrand 1957) associated with the family cycle rather than their own rites of passage and individual life cycle.

5.5.4 Migration and Distances Moved: Serengeti District

The relationship between migration and distance has been one of the most widely researched topics in the geographic analysis of migration. Ravenstein's (1885, 1889) and Zipf's (1946) postulate of an inverse relationship between the number of migrants and distance moved seems to be one of the few, almost universal, generalizations in migration theory. However, the meaning of distance, the ways of operationally measuring it, and the types of models of migration-distance relationships derived have differed in various studies (Mandal 1981b). Distance may mean physical distance, the time it takes, or the pecuniary and psychological costs involved in getting from one place to another.

Distance may be measured as a straight line between two points (Lewis 1982) or centroids of areas (Wen Lang Li 1981), or logarithmically transformed (Hägerstrand 1957) because people may perceive distances to nearby places differently than distant locations (Huff 1960, Gould and White 1968). People may move between locations in a stepwise fashion by breaking up long-distance migration into a series of shorter-distance shifts, they may migrate to and up or down the hierarchy of urban places, or move as part of a chain migration with the help of kin (or others) who moved to a destination earlier (Lewis 1982). Thus, several different models of the migration-distance relationship have been derived (e.g. exponential, log-normal, etc.) and postulated (Wen Lang Li 1982, Zipf 1946, Stouffer 1940).

Children under the age of 15 years, as passive migrants, were excluded from the analysis of the distance and migration inter-relationship. However, children as migrants certainly have to adjust to the changes in spatial and social locus, and as important contributors to household labour, also adjust to changes in the agroecological locus. How children participate in processes of migration and readjustment in new locations has remained mainly unresearched; what the psychological effects of their migration, especially forced relocation, are remains ignored and yet children are usually the largest component of displaced and refugee populations of the world.

It had been earlier hypothesised that the number of migrants was inversely related to the distance (km) moved (cf. hypothesis 2). Table 5.11 presents the number of migrants for 11 distance categories for three main time periods (since 1988, between 'villagization' and 1987, before 1973; total=815). The number of migrants generally decreased as the distance moved increased but this decline was not linear and monotonic because of the effects of the different migration fields (ethnic, intra-district, contagious districts, intra- regional, extra-regional, external). Thus, hypothesis 2 could be rejected. The migration-distance relationship for the period since 1988 could be modelled as follows:

$$M = 83.6 - 6.87 \text{ Distcat}; \text{ Adjusted } R^2 = 0.367$$

$$(4.75) \quad (-2.65)$$

where M=Number of migrants, Distcat = Distance category (1-11); Standard Error of Estimate=27.2, F=7.01, df=1, 9; p=0.027. The t values in brackets were significant at $p < 0.05$.

Table 5.11 Distances (km) Moved by Migrants: Serengeti District

Distances	Since 1988	1973-1987	Before 1973
< 10 km	102	92	4
11-20	97	75	15
21-30	62	15	11
31-40	4	7	6
41-50	53	6	1
51-60	38	13	6
61-70	24	14	15
71-80	11	6	11
81-90	9	0	1
91-100	14	18	0
101> km	52	33	0
Total	466	279	70

Source: Household Survey, 1991.

Gender has long been considered as a factor in the selectivity of and differential migration patterns (Ravenstein 1885, 1889). In apparently male dominated communities, males have been expected to move farther than females (Wen Lang Li 1981). However, in Serengeti district the distances moved by males and females in their most recent lifetime move (Table 5.12) did not differ significantly ($t=0.223$, $p=0.823$). Wen Lang Li (1981) concluded the same for Korean migrants.

Table 5.12 Distances (km) Moved By Male and Female Migrants: Serengeti District

Sex	N	Mean Distance	Std. Dev.
Males	368	56.1	112.6
Females	447	54.4	104.3

Source: Household Survey, 1991.

Nor did the average number of lifetime moves made differ significantly according to gender. A total of 549 males made 683 moves while 625 females made 770 lifetime moves to give each group an average 1.24 and 1.23 number of migratory moves. When those who had never moved were excluded from the population, the average number of lifetime migrations by males were 1.85 and by females 1.79. Females were perhaps less mobile, contrary to Ravenstein's (1885, 1889) conclusion that they were more likely than males to be involved in short-distance migration.

Education has been considered as a factor that may influence migration behaviour (Connell et al. 1976, Bell 1980) and positively influence the distances moved by migrants (Rose 1958, Wen Lang Li 1981). In Serengeti district, the average distance (km) moved by migrants in their most recent lifetime move did not differ according to the level of their schooling (Table 5.13; Bartlett's $\chi^2=157.7$, $df=3$, $p<0.001$; $F=1.75$, $df=3$, 692; $p=0.155$). Only migrants above the age of 7 years were considered in this analysis. Primary education equalled completion of Standard 7. The results were contrary to Rose (1958) and Wen Lang Li (1981) who observed a positive association between the levels of schooling and distances moved by migrants in the U.S.A. and Korea respectively.

Table 5.13 Level of Schooling and Distance (km) Moved: Serengeti District

Category	N	Distance Moved	Std. Dev.
No Schooling	286	47.1	65.9
1-6 yrs	191	61.6	106.6
Primary	187	60.7	145.8
Above Std 7	32	86.4	163.2

Source: Household Survey, 1991.

However, the average distances (km) moved by migrants of different types in their most recent move did differ (Table 5.14). Thus, hypothesis 3 could be rejected as applied to the differences in the average distance moved by primary and repeat migrants. Those who moved for the first time (primary) migrated about half as much greater distance on

the average than repeat migrants ($p=0.05$).

Table 5.14 Average Distances (km) Moved by Migrant Types: Serengeti District

Migrant Type	N	Mean Distance	Std. Dev.
Primary	434	61.4	110.4
Repeat	303	40.7	82.5
Return to Birthplace	36	88.1	218.2
Return to Other Place	40	69.5	98.0

Source: Household Survey, 1991.

While the average distance moved by those who returned to their birthplace was greater than that moved by repeat migrants, this difference was not significant ($p=0.06$). Thus, hypothesis 3 as applied to the differences in the mean distances moved by return migrants to their birthplace and repeat migrants was accepted.

Some studies have suggested that earlier migration experience affected subsequent migration behaviour (Findley 1987, Bell 1980) but in the case of the Serengeti's residents, having migrated previously did not affect the distance moved in subsequent movement or moves.

The causes of movements, the processes of obtaining residency in a destination village and processes of relocation are considered in the next chapter.

Chapter 6

Causes of Migration and Processes of Relocation

The question "why do people move?" is a fundamental query in migration research (Kosiński and Prothero 1975), perhaps most asked and yet least understood (Jansen 1969). Three main approaches have been used to seek an explanation for the movement of people: (i) through a study of the structural determinants of aggregate migration rates between places to infer motives for the movement of a person, (ii) by obtaining a migrant's reasons for moving, and (iii) by combining a migrant's subjective evaluation of place-related values and characteristics with the objective inference from the analysis of structural determinants (Taylor 1969, Gardner 1981). According to Germani (1965), an analysis of the causes of migration can be carried out at three complementary levels: (i) objective, (ii) normative, and (iii) psycho-social. The objective level of analysis aims to explain migration in an area through a study of the attributes of the people and their environment; the normative level analysis is concerned with the institutional system, values, beliefs and expectations of a society which are the context in which a person decides to move or not to do so; and, the psycho-social level of analysis takes into account the perceptions, attitudes and expectations of individuals themselves.

The analysis of the causes of migration among households in the Serengeti district was carried out using a combination of all the three approaches outlined above. This chapter first examines the macro-level determinants of population growth and net migration in the regional setting, and in the villages of Serengeti district. Such analysis is most useful for understanding the context of population issues and policies that are appropriate for rural development and ecological conservation. Causes of movement can not be ascribed to population aggregations and places but only to individuals and households that migrate. Thus, the second section of the chapter considers, at the micro level, the reasons for moving stated by a sample of migrants and the relative significance of 'push' and 'pull' type variables in their migration intentions. The third section of the chapter notes the distances moved by migrants for various categories of reasons, and

discusses the relationship between the reasons for migration, the objective situations of migrants and their subjective evaluations of these situations. It also examines the duration and modes of household relocation. The final section describes the sources of information for migrants about potential destinations, the processes of acquiring residency rights in a destination village, and the role of village government policies in regulating rural-based migration.

6.1.1 The Determinants of Migration in the Serengeti Area

According to the 1988 census, the population of Serengeti district was overwhelmingly rural and most people earned their livelihood from cultivation and mixed farming (Table 6.1). Farming was also significant among the urban population. Those earning incomes from waged employment included district and village

Table 6.1 Occupations of Serengeti District Residents, 1988

CATEGORY	LOCALITY	
	Rural	Urban
% population	94.0	6.0
% wage employed	3.5	27.4
% farmers	81.2	51.0
% unemployed	14.8	21.7

Source: Calculated from Bureau of Statistics, 1992a.

government workers, employees in the provision of health care, education and other social services, traders, sales clerks, restaurant workers, mechanics and artisans. Overall, about a third (30.1%) of salaried employees and traders in the district were in the urban area (Bureau of Statistics 1992a). The unemployed above the age of 14 years were mainly students, the old and infirm. Hunting and fishing were and are also significant sources of rural livelihood, i.e. ways of obtaining subsistence and income.

Since there were few employment opportunities in the Serengeti district, movements for employment were not expected to be a major factor in the migration decisions of

individuals and households. Instead, the need for resources (e.g. more land, pastures and more fertile soils), social and psychological factors (e.g. family ties and obligations), changes in the life cycle (e.g. marriage, divorce), insecurity because of socio-political conflict, illness and death, and food insufficiencies were expected to be among the main causes of migration. The dominant structural determinant of population redistribution was expected to be the availability of resources, primarily to satisfy subsistence needs. Malcolm (1953:105) observed that "increasing population densities have stimulated migration", either to seek employment, usually in the urban centres, while those desiring to cultivate land migrated to other rural areas (Collier et al. 1986).

Data for administrative divisions (Table 5.4, chapter 5) of the Musoma (including Bunda and Serengeti) and Tarime districts for the 1957-88 period were used to examine the inter-relation between population growth and densities. The rates of population growth and estimated net migration were highly, and positively correlated. Only population growth rates were used in this analysis to avoid problems of multicollinearity. The general form of the inter-relation between population growth (%PGR/yr.) and density (persons per Km²) was $PGR = f(\text{density})$. It was expected (cf. hypothesis 5) that the annual rates of population growth in divisions during an inter-censal period was inversely related to the densities of the divisions at the beginning of the inter-censal period. Both linear and exponential models were estimated but only the results of the exponential model and significant relationship are shown (Table 6.2). The density values were natural log transformed to 'normalize' the density distribution and allow a simple,

Table 6.2 Population Growth and Density: 1957-1988

Model: $PGR = f(\text{Ln Density})$

Census Period	N	R	Adjusted R ²	Std. Error of Estimate	F	p
1957-1967	16	0.87	0.73	2.74	41.95	<0.001
1967-1978	16	0.27	0.00	1.39	1.10	0.312
1978-1988	16	0.21	0.00	1.16	0.63	0.440

Source: Calculated from 1967, 1978, 1988 census data and Thomas

(1971).

linear regression to be computed for each inter-censal period. The inter-censal periods were 1957-1967, 1967-1978, and 1978-1988.

The results indicated, as expected, that population growth was higher in areas of lower population density during 1957-1967 but after that, population growth had no significant relationship with density. Thus, hypothesis 5 could be rejected as applied to the 1957-1967 population growth rates but accepted as applied to the trends during the 1967-1978 and 1978-1988 periods. For the 1957-1967 period, the significant regression model was as follows:

$$E(PGR) = 22.43 - 5.31 (\ln \text{Density})$$

(7.64) (-6.47) ; (t-values in brackets at $p < 0.001$)

where $E(PGR)$ = Estimated (%Population Growth Rate/Year)

The results also suggested that the regional effects of the population gradient as a factor influencing local growth trends declined and became insignificant after 1967. Agricultural densities may be more appropriate as an indicator of the population-land relationship, but physical density was used as a measure to take into account the important role of livestock in rural livelihood and ecological carrying capacity.

After 'villagization' during 1973-74, wards and villages became the basic units of community administration. 'Villagization' appeared to have altered the regional density and population growth relationship, with sub-divisional level factors assuming dominance in determining population changes. Data from the 1978 and 1988 censuses were used to compute the annual rates of population growth and estimate the rates of net migration for the villages of the Serengeti district, and the wards of Serengeti, Bunda, and Musoma Rural districts.

It was expected that the annual population growth rate (%) and net migration rate in a ward during the 1978-1988 period would be inversely related to the population density of the ward in 1978, and positively related to the availability of land for cultivation in

the ward in 1978. The effects of population pressure were envisaged to operate on households and individuals as well as on the aggregate level. Thus, wards with higher dependency ratios were expected to be sources of out-migrant households seeking land to satisfy their subsistence needs. The dependency effect was measured by the ratio of children (0-14 years) to the rest of the population in the ward in 1978. It was also expected that wards in the agroecological zone with higher and less variable rainfall, better local drainage and soils, hence more favourable for agriculture, would have relatively higher population growth, including more net in-migration. In contrast, wards adjacent to the boundaries of the Serengeti National Park were considered to be relatively unfavourable to agricultural activity because of the potential for damage and destruction of crops by wildlife. Such wards were expected to have relatively lower population growth and have little or no in-migration.

Linear, multiple regression analysis was used to determine the relationships between inter-censal population growth (Popgrow) and net migration (NetMig) rates as dependent variables, and the population densities (LnDens78), the percentage of land cultivated (Cult78), and the dependency ratio (Dependen) in wards in 1978 as the independent variables.

The ward population densities were calculated as outlined in Chapter 4, and land availability in a ward in 1978 was as defined by LZP (1982) map annex 2.1/3. This map classified each ward into one of five equal interval categories according to the percentage of its land cultivated in 1978; category 1 represented 20% or less land cultivated, and category 5 had more than 80% land cultivated. The larger the proportion of a ward area cultivated in 1978, the lesser was the availability of land to support subsequent population growth. The dependency ratios for wards in 1978 were calculated from the 1978 census data. Each ward was assigned to one of three agroecological zones with increasing rainfall amounts and reliability, better drainage and soils: the upland lakeshore (zone 1), the upland plateau (zone 2), and the hills/highlands (zone 3). Each ward was also classified according to its location (yes=1, no=0) adjacent to the national park boundary. The annual population growth rates for wards was calculated using the exponential growth formula and the annual rates of net migration were estimated

according to Bogue et al. (1982). The population density values were natural log transformed to normalize their distribution.

The regression model for population growth (Table 6.3), was based on 42 wards, had an adjusted $R^2=0.250$, and a standard error of estimate of 1.541. It indicated that 1978-1988 population growth rate per year was, as expected, lower in wards that had relatively

Table 6.3 The Determinants of Population Growth in Wards, 1978-1988

Variable	Coeff.	Std. Error	Std. Coeff.	T	p(2tail)
Constant	13.081	3.046	0.000	4.294	<0.001
LnDens78	- 1.457	0.409	-0.735	-3.566	0.001
Cult78	0.744	0.312	0.491	2.388	0.022
Dependen	- 0.060	0.028	-0.293	-2.157	0.037

F=5.564, df=3, 38; p=0.003

higher densities. Contrary to expectation, population growth was higher in wards that had a larger percentage of its area cultivated in 1978; and, population growth was higher in wards that had relatively lower dependency ratios of children to the rest of the population. Thus, hypothesis 6 could be rejected as applied to the relationships between the rates of population growth in the wards during 1978-1988 and the proportions of the ward areas cultivated in 1978, the population densities in the wards in 1978, and the dependency ratios in the wards in 1978. The effects of density had about half as much influence, and about two and half times as much influence than the effects of child dependency in determining the variations in population changes in wards. The agroecological characteristics of the ward and its proximity to the boundary of the Serengeti National Park had no significant effects in determining population growth. Thus, hypothesis 6 as applied to the relationships between population growth in the wards during 1978-1988 and the agroecological characteristics of wards, and the proximity of wards to the boundary of Serengeti National Park could be accepted.

The regression model for net migration (Table 6.4) was also based on 42 wards, had an $R^2=0.270$, and a standard error of estimate of 2.223. The results indicated that the determinants of net migration in wards were, as expected, the same factors that were

significant in accounting for the variations in population growth. The annual rates of population growth and net migration were strongly and positively correlated ($R^2=0.984$, $df=41$, $p<0.001$). The relative influences of population density, land availability, and child dependency in determining net migration were similar and about of the same magnitudes as these determinants had on the rates of population growth. Thus, hypothesis 6 as applied to the relationships between the rates of net migration in wards during 1978-1988 and the population densities in 1978, the dependency ratios in 1978, and the proportion of ward areas cultivated in 1978 could be rejected. The hypothesis as applied to the relationships between net migration rates and the agroecological characteristics of wards, and ward proximity to the boundary of the national park could be accepted.

Table 6.4 The Determinants of Net Migration in Wards, 1978-1988

Variable	Coeff.	Std. Error	Std. Coeff.	T	p(2tail)
Constant	15.675	4.394	0.000	3.567	0.001
LnDens78	- 2.173	0.589	-0.749	-3.686	0.001
Cult78	1.022	0.450	0.462	2.274	0.029
Dependen	- 0.090	0.040	-0.299	-2.235	0.031

F=6.048, df=3, 38; p=0.002

Both the regression models accounted for about a quarter of the total variation in the dependent variables. The model for net migration accounted for about 2% more variation as compared to the regression for population growth. An inspection of the correlations between the predictor variables suggested that collinearity between some predictor variables had significant effects on the regression models even though the variables were conceptually distinct. For example, population density and the percentage of ward area cultivated were correlated ($r=-0.753$). This collinearity effect was not pursued any further in the analysis, although factor analytic techniques may have been a useful approach to resolve the problem.

With almost 75% of the total variation in population growth and net migration not be explained at the ward-level of analysis, the trends and determinants of population

change and net migration were examined for the village-level, especially in the context of the regulating role that village, local governments exerted on in-migration. Only the villages of Serengeti district were considered. The annual rates of population growth of the villages were expected to depend on their demographic, locational, agroecological, and socio-economic features. After 1978, 10 new villages were established in the Serengeti district mainly by people from the other nearby villages. Some villages split because they were very large (e.g. Machochwe). These new villages were excluded from the analysis of the determinants of population change because their inter-censal population trends could not be calculated. Village population densities could not be estimated because village boundaries had not been mapped as yet by the national government.

Linear, multiple regression analysis was carried out to identify the determinants of overall population, and net migration trends in the villages of the Serengeti district (Appendix I). More specifically, smaller villages were expected to grow faster since land was more likely to be available and villages located in the areas of higher rainfall and more fertile soils of the hilly, highlands were expected to have higher population growth rates than the villages of the upland plateau because of the more favourable agroecological conditions in the highlands for agriculture. Those villages on and closer to the main roads, and with more road connections to other settlements, were expected to have relatively higher population growth because of their better accessibility to obtain needed goods and social services (e.g. district hospital, markets, government services), and transportation for their agricultural products. Villages located closer to rivers were expected to have relatively faster growth because water was a critical resource for survival and sedentary life. The availability of land and all-year water supply, good accessibility and favourable conditions for agriculture were expected to attract in-migrants. However, villages located closer to the boundaries of the Serengeti National Park were expected to have relatively lower population growth rates because of the potential for damage to crops by wildlife and the constraints on settlement expansion into the protected game areas. Finally, the population trend in a village was expected to be inversely related to the trend in the nearest village because most migrants were likely to

move from nearby areas of settlement. The relevant null hypotheses are outlined in hypothesis 7 and its sub-hypotheses (i)-(v).

The 1978 village populations were classified into 7 size classes (Sizecl78): each class had an interval of 1,000 persons and ranged in size from the smallest villages with populations below 1,000 persons and the largest villages with more than 6,000 people. The straight line distances from a village to the permanent rivers (DistRiv), all season main roads (DistMnRd), and to the park boundaries (DistSnp) were measured on a village map with a scale of 1:250,000. The connectivity of a village (VilConnect) to other settlements was derived by adding the total number of settlements to which a specific village had a direct, road connection in all directions. Villages were also classified according to their agroecological location (AgroZone): whether in the hills and highlands, or on the upland plateau. The annual population growth rates (Growth) during 1978-1988 were calculated using the exponential growth rate formula and the estimate of net migration growth rate (NMGR) was derived according to Bouge et al. (1982). They formed the dependent variables (Appendix I).

The regression model for population growth (Table 6.5) was based on data for 41 villages, accounted for 25.7% of the total adjusted variance and had a standard error of estimate of 3.942.

Table 6.5 The Determinants of Population Growth in the Villages of Serengeti District, 1978-1988

Variable	Coeff.	Std. Error	Std. Coeff.	T	p(2 tail)
Constant	5.820	1.618	0.000	3.598	0.001
Sizecl78	-2.014	0.598	-0.459	-3.370	0.002
PopgrNv	0.333	0.161	0.282	2.071	0.045

F=7.908, df=2, 38; p=0.001

The results indicated that the annual rate of population growth in a village was inversely related, as expected, to the population size class of the village in 1978 and positively related to the rate of population growth in the nearest village (PopgrNv). Thus,

sub-hypothesis (i) of hypothesis 7 could be rejected. The number of direct road links of a village with other settlements, its proximity to the all season main roads, and to the boundaries of the Serengeti National Park had no significant influence on the rates of population changes during the inter-censal period. Neither were the population trends in the villages influenced by their proximity to the rivers as a source of water and nor did the agroecological characteristics have any significant effects. While there was a positive relationship between population growth rates in a village and its nearest neighbour, the distance between them had no significant effect on their rates of population growth during 1978-1988. Thus, sub-hypotheses (ii)-(v) of hypothesis 7 could be accepted.

The regression model for net migration (Table 6.6) accounted for about 22.1% of the total adjusted variance and had a standard error of estimate of 5.841. Both the size class of the village population and the population growth rate in the neighbouring village had significant influences in determining the net migration rate per annum in a village during the 1978-1988 inter-censal period. The larger the size of the village in 1978, the

Table 6.6 The Determinants of Net Migration in the Villages Serengeti District, 1978-1988

Variable	Coeff.	Std. Error	Std. Coeff.	T	p(2 tail)
Constant	4.816	2.397	0.000	2.009	0.052
Sizecl78	-2.595	0.886	-0.409	-2.931	0.006
PopgrNv	0.513	0.238	0.300	2.153	0.038

F=6.687, df=2, 38; p=0.003

less was the in-migration in the village over the following decade. The rate of in-migration into a village also declined as the population growth rate in the neighbouring village became larger, including from in-migration. The pattern of net out-migration and depopulation of villages also extended beyond single villages and at least over the nearby village. Hence, sub-hypothesis (i) of hypothesis 7 could be rejected as applied to the relationships between the rates of net migration in villages during 1978-1988, and the

population size of villages in 1978. Sub-hypotheses (ii) to (v) of hypothesis 7 could be accepted as applied to the relationships between the rates of net migration in villages during 1978-1988, and the agroecological characteristics of villages, the relative accessibility between villages, the distance between a village and its nearest neighbour, and the proximity of villages to the boundary of Serengeti National Park.

The observed relationship between the population trend in a village and its nearest neighbour was contrary to expectation. Perhaps, the effects of variations in the levels of migration, fertility and mortality as factors affecting population trends and densities were not restricted to individual villages, nor were they regional as observed from the divisional-level analysis, but extended across the meso-level of village neighbourhoods. Trend surface modelling may be useful in ascertaining the spatial size of such neighbourhood effects of population change. The analyses of the determinants of population change and net migration at the division, ward and village levels also indicated the effects of spatial scale as a factor affecting the patterns and determinants of population dynamics.

The macro-level approach of analysis imputed but did not indicate how individuals and households perceived population growth, village size or density and took them into account in their migration decision making processes. The reasons given by migrants for moving, their likelihood of relocating under specific social, economic and ecological circumstances, and the political context in which population movements are undertaken were more useful sources of information on the dynamics of population in the Serengeti area.

6.2. The Reasons for Migration: Serengeti District

The reasons for migrating "represent the simplest and most direct statement about the phenomenon by the decision maker" (De Jong and Fawcett 1981:35) and provide information on the structural 'push-pull factors', obstacles that hinder, and factors that facilitate movement. However, Pryor (1975) has observed that the reasons for moving stated by migrants are a meso-level analysis rather than a micro-level assessment of the motivations for moving. In his view, the analysis of "reasons for moving" needs to be

supplemented with a micro-level study of the information context and the decision-making processes to understand migration motivations. The approach of identifying the determinants of migration based on asking migrants their reasons for moving has a number of important shortcomings: the reasons stated may be affected by problems of accurately recalling the reasons for moving, especially if the migration survey is conducted a long time after the actual movement; respondents may rationalize or justify their motivations for relocating *ex post* rather than state the true reasons for moving; it is difficult to determine the relative importance of the several factors that usually cause migration (Kosiński and Prothero 1975); and, the reasons stated may help to identify the important factors causing migration but provide no insight into the ways in which people weigh and decide between the benefits of the place they live in and other places (De Jong and Fawcett 1981).

The sample of 76 in-migrant households in the 19 Serengeti villages surveyed were asked to state their reasons for migrating from their previous village of residence. In addition, a separate inquiry was made in a latter part of the interview if the move was due to a failure to satisfy the needs for food and income, and any other reasons for the migration of the household. The question aimed at examining the specific roles of food and income in migration decisions and as a means of assessing the reliability of the reasons for moving stated earlier. The data were then used to examine three main aspects of the stated reasons for households to move: the number and types of reasons for migration of households, the effects of ethnicity and the socio-political conflict since 1985 in the Serengeti district on household reasons for moving; and, the average distances moved by households for the main types of reasons for moving.

6.2.1 Number of Reasons for Moving Stated by Households

A majority of households (56.5%) that moved since 1985 did so for two or more reasons (Table 6.7). Households moving for a single reason included return migrants: five households had earlier moved to avoid the socio-political conflict and one household had moved to get medical treatment. They had subsequently returned to the village of their earlier domicile. Four households migrated for reasons related to employment: one

head of household was hired as a teacher; a teacher and a village government secretary were given job transfers; and, a head of household working in Arusha town, about 330 km away, moved to the village with his family after retirement from his job to reunite with the rest of his extended family.

Table 6.7 Number of Reasons Stated for Household Migration

Number of Reasons	Number of Households (N)			
	Moved Since 1985		Moved Before 1985	
	N	%	N	%
1	33	43.4	13	54.2
2	22	28.9	6	25.0
3	17	22.4	4	16.7
4	3	3.9	1	4.2
5	1	1.3	0	0.0
Total	76	100.0	24	100.0

Source: Household Survey, 1991.

The number of reasons stated for migration did not differ according to the sex of the head of household ($\chi^2=0.810$, $df=2$, $p=0.677$). Having or not having had schooling may significantly affect the number and types of reasons that respondents articulate for their migration. However, the stated number of reasons for migrating was not associated with having or not having been to school ($\chi^2=3.586$, $df=2$, $p=0.166$).

The social and political context of migration in the Serengeti and Bunda districts changed in 1985 when inter-clan and tribal conflict began (Christiansson and Tobisson 1989). The key question was whether households which moved after the outbreak of conflict were mainly doing so for the single reason of avoiding the conflict and its consequences such as insecurity, theft of livestock, and even death within the household and the village community. Newspaper reports noted (as cited in Christiansson and Tobisson 1989:52) that between January and August 1986, over a hundred people lost their lives and more than 25,500 cattle were rustled in the Serengeti district. This represented about 10-15% of the district's total cattle population and much of it was claimed to have been smuggled out across the frontier because of higher prices in

neighbouring Kenya. The conflict and stock thefts in the Serengeti district continued until mid-1991 when government efforts to restore law and order became successful.

A random sample of 24 other households that had moved into the villages prior to 1985 were also asked to state their reasons for migrating out of their previous village of residence. It was expected that households would not differ significantly in their number of reasons for migrating in the period before and after the outbreak of socio-political conflict. The results in Table 6.7 also indicated that almost half (45.9%) of the households that had migrated before 1985 moved for two or more reasons. About one fifth of the households that had moved for a single reason (20.8%) did so as a result of relocations associated with the 'villagization' of scattered homesteads carried out during 1973-1974. A chi-square (χ^2) test was carried out after pooling the responses into three groups (1 reason, 2 reasons, 3 or more reasons) because of the sparse (<5) number of observations in some of the frequency distribution cells. The test is also sensitive to sample size but indicated that households which moved before and after the outbreak of social conflict in 1985 did not differ in the number of reasons they stated for their migration ($\chi^2=1.73$, $df=2$, $p=0.917$).

Thus, households that moved within and into rural Serengeti district moved for several reasons rather than a single one, and this seemed to be the case over time despite the outbreak of social conflict in the Serengeti district. The observation by Kosiński and Prothero (1975) that migration is usually due to multiple reasons also holds true for households of the Serengeti district. But the kinds, rather than the numbers, of reasons for moving were of greater significance in the analysis of household migration.

6.2.2 The Reasons for Household Migration

Household movements in the Serengeti district were expected mainly to be associated with the agricultural opportunities and constraints, for social reasons such as conflicts or for family reunification, and because of the combined effects of social and agricultural resource factors, for example young males who had 'become of age' moving to obtain land and set up a household. The different reasons stated by the households for moving out of their previous villages of residence since 1985 could be grouped into six main

categories of inter-related reasons (Table 6.8).

Table 6.8 Categories of Reasons for Household Migration Since 1985

Reasons for Moving	Number of Households	%
Resources:	(24)	31.6
Land	1	
More/better land/pasture	8	
More/better land - inadequate food/income	15	
Social and Psychological:	(24)	31.6
Family reunification	7	
Illness	4	
Illness/death	6	
Clan strife/insecurity	6	
Clan strife/death	1	
Social - Resources:	(14)	18.4
Family disagreement - land	3	
Family unification - land	2	
Insecurity - land	1	
Stock theft - security	3	
Illness/Death - land	5	
Environmental:	(4)	5.3
Floods, wildlife impact	3	
Environmental change	1	
Employment:	(4)	5.3
Employment/transfer/retirement	4	
Return Migrants:	(6)	7.9
Return migrants - inadequate food/income	3	
Return migrants	3	
Total	76	100.1

Note: Sub-totals are shown in brackets. Percentage total greater than 100 because of rounding error.

Source: Household Survey, 1991.

The 'resources' and 'social and psychological' related groups of motives dominated the reasons stated for household migration. Resource related reasons for migration were mainly of two types: households which moved to obtain more land, more fertile land and more pasture; and, households that were unable to obtain their needed food and income and thus migrated for more and better land. Landlessness and lack of land ownership

were not a significant cause stated by households for migration since access to land in rural Tanzania is assured for people under the provisions of the Ujamaa Villages Act of 1975. While no household possessed title deeds, their ownership of land is recognized under customary and national law. The situation in Tanzania contrasts markedly from the role of landlessness as a reason for migration in other rural areas of the world: 17.8% of migrant reasons for moving from the hills to the lowlands of Nepal were a consequence of not having land (Conway and Shrestha 1981:156); 11.2% of migrants from the wet to the dry zone of Sri Lanka owned no land and another 3.9% cultivated encroached, mainly Crown, land (Abeysekera 1984:130); and 24% of Pasano households in Costa Rica were landless (Barlett 1982:54). The only household that moved to obtain land to cultivate was from the city of Mwanza, about 245 km away on the shores of Lake Victoria, and there it had been involved in very small scale trading.

Among the 'social and psychological' reasons for migration, moves associated with illness and death, inter-clan and tribal strife, and for family reunification were the most important. Some of the migration for family reunification resulted from divorce and old age while illness and deaths that motivated migration were in some cases attributed to witchcraft. About 15.6% of the households reported that their migration was associated with death in the household or among other kin. Migration associated with death is one of multi-phasic demographic responses (Davis 1963, Grigg 1980), yet few studies at the micro-level report illness and death as causes of relocation by individuals and households. Henriques (1985) found that 7-11.4% of migrant settlers and 4.5-7.1% of the 'agregados' (settlers without title deeds) in Ouro Preto and Gy-Parana areas of the Brazilian state of Rondonia were affected by illness. Morbidity was among the major difficulties faced by the in-migrants. Buksmann (1980) reported that 2.9% of migrants into the Monteagudo area of Bolivia cited death and divorce as reasons for migration; and, divorce or the death of parents were the two main causes of migration by women to work in Dar es Salaam, Tanzania (Swantz and Bryceson 1976). The higher incidence of death observed in the Serengeti study area when compared to the situation in the Monteagudo highlands was perhaps associated with poorer health and environmental conditions, and the social conflict.

The movement of households associated with morbidity and mortality in the Serengeti district needed to be considered in the context of the 1978-88 inter-censal demographic trends and survivorship in the district. Some preliminary analysis suggested significant increases in the mortality of children and youths (Table 6.9), perhaps resulting from the combined effects of food insufficiencies, diseases and poor availability of water during

Table 6.9 Percentage of Women and Ratios of Children/Women for Serengeti Wards, 1978-1988

Year	1978	1988	1978	1988	1978	1988
WARD	W(15-54)	W(15-54)	R(0-4)	R(0-4)	R(0-14)	R(0-14)
Mugumu R.	23.1	23.6	91.8	81.3	227	223
Mugumu U.	24.2	25.0	75.8	75.3	188	201
Robanda	23.7	22.9	82.1	78.6	195	212
Natta	22.2	23.4	82.3	71.5	206	202
Issenye	23.3	23.0	73.6	73.6	204	214
Kisaka	21.9	23.2	96.5	82.6	246	224
Ringwani	22.9	24.4	84.9	72.6	225	191
Kenyamonta	23.1	23.4	84.8	74.7	225	216
DISTRICT	23.0	23.6	86.7	77.2	222	215

Note: W (15-54) = % Women (15-54 years), R(0-4) = Ratio of Children (0-4)/ 100 Women(15-54), R(0-14) = Ratio of Children (0-14)/ 100 Women (15-54)

Source: Calculated from Bureau of Statistics (1983, 1992)

a period of drought and socio-political strife. The ratios of children (0-4 years) per 100 women (15-54 years) and children (0-14 years) per 100 women (15-54 years) declined between 1978-1988 in most of the wards of the Serengeti district. But the proportion of women (15-54 years) in the total population did not alter as significantly. Institutional populations, e.g. army barracks, prisons, etc. were excluded from the calculation of the various ratios.

The least changes in the ratios of children under 5 years to adult women was in Mugumu Urban ward which has the district hospital while the ratio for the population of Issenye ward did not change either, perhaps because of its access to health facilities in Ikizu. Alternatively, the decrease in the ratio of children (0-4 years) to women (15-54)

ratio could be attributed to a decline in fertility rates during 1978-88. Fertility control was unlikely to be a major factor: in 1991/1992, only 7.9% of married women of Mara region used any method of contraception; about 3% used modern methods and about 4.9% used traditional methods (Bureau of Statistics-DHS 1993).

The third most important category of reasons for household migration were moves for resources associated with social factors. No particular combination of 'social and resources' related reasons clearly dominated this category of migrants. Five households in the category moved because of death within their household and the need to obtain land or more land. Such moves involved mainly young males (25-40 years old) and one widow. Family discord motivated three households to move to obtain land, two households moved to obtain land as well as reunite with other members of their families, and four households migrated to obtain land in other villages because of the theft of their livestock and insecurity.

Return migrants comprised 7.9% of the households that had moved: five of these six households had earlier moved because of the inter-clan and tribal conflict. These households considered security in the village to have improved and thus conducive to their return. None of them had any land to cultivate and three of the four households were unable to obtain their needs of food and income in the places that they had moved to in the neighbouring Bunda and Tarime districts, and to Kenya. One household had moved to a village near Bunda town to seek medical treatment in a district hospital and then returned to the village. Four of the migrant households moved for reasons related to employment: these included job transfers, retirement, and having secured a job. The category had an equal representation in the sample of household reasons for migration since 5.3% of the population of the district above the age of 14 years has waged jobs or is self-employed as traders, etc. The last category, of 'environmental' related reasons, were household moves for land elsewhere because of the repeated flooding of their croplands, and due to crop destruction by wildlife. Only one household moved for a change in the living environment, having become tired of residing for a long time in the previous village.

The main types of reasons stated for household migration did not vary according to the sex of the head of the migrant household ($\chi^2=0.234$, $df=2$, $p=0.890$), the level of schooling (none, some) of the head of the household ($\chi^2=3.586$, $df=2$, $p=0.166$), or the ecological zone (lakeshore-upland plateau, highland/hilly) of origin of the household ($\chi^2=2.029$, $df=2$, $p=0.363$). The types of reasons for migration of households before and after 1985 indicated important contrasts. More than a third of households (37.5%) that moved before 1985 did so for 'resources' related reasons, particularly for more land, more fertile land and more pasture. In contrast, 31.6% of household moves since 1985 were due to resource related reasons. A quarter of the pre-1985 as compared to 31.6% of post-1985 household moves were for 'social and psychological' related reasons, including migration, for example, for family reunification and those compelled by death and illness. The movements for 'social-resource' (8.3%) and 'environmental' (8.3%) related reasons prior to 1985 were fewer than in the post-1985 period due to the same categories of reasons (18.4% each). No households stated employment as a factor for motivating migration and there were no return migrants among the sample of pre-1985 migrant households. However, 'villagization' was a major factor in the relocation of 20.8% of the households that had moved prior to 1985.

It was difficult to establish if the above contrasts reflected significant differences in the relative importance of the various factors (resources, etc.) as causes of household migration over time because of the small sample sizes of households for analysis. But it could be concluded with confidence that households in the Serengeti area had moved due to various kinds of causes, usually for several rather than a single reason, unless forced to move because of violence and death or because of the requirements of public policy such as settlement schemes, 'villagization', and relocation of people from areas to create national parks, etc.

Nine households moved because of causes associated with the effects of ethnicity, inter-clan disputes, and insecurity. The movement of people in migration fields differentiated according to ethnic composition was, as noted in chapter five, an important feature of population dynamics in the Serengeti district. Such fields owed their re-emergence particularly to the banditry and ethnic conflict since 1985. Inter-clan conflict

and insecurity was a factor in the migration of five (17.2%) of the 29 households that moved between territories inhabited by single clans. Two WaNyabasi households migrated out of WaKira clan territory to their own clan territory, while a MKira household living in WaNyabasi clan area moved to WaKira clan territory. Similarly, two AbaRenchoka households migrated out of WaKira clan territory into their own clan territory.

In contrast, only one of eight households that moved from villages with multi-ethnic populations into villages inhabited by a single clan-type did so because of ethnic conflict. The rest moved for land or were return migrants. Areas of multi-ethnic populations, mainly in the southern half of the district were also affected by the conflict and insecurity, including stock rustling and banditry. Among the 39 households that moved between multi-ethnic villages, four did so because of ethnic conflict and insecurity but movements because of illhealth and for family reunification were more than twice as many as in areas settled by single clans. These variations were significant because the most intense conflict was between clans in areas inhabited by uni-ethnic populations of the hilly, highlands areas.

6.2.3 Reasons for Migration and a 'Push-Pull' Framework

The reasons stated for migration were considered in the framework of 'push' and 'pull' factors (Lee 1966, Bogue 1969, Conway and Shrestha 1981, Lewis 1982). 'Push' factors reflected conditions of life in the places of origin and 'pull' factors reflected conditions of living in places of migration destination. While the 'push-pull' model provided an "elegant abstraction of the specific forces generating migration" (Lewis 1982:101), the model has been criticized as an oversimplification of a very complex process (Lewis 1982, Nurun Nabi and Krishnan 1993).

It was difficult to clearly separate reasons stated for household moves into those associated with 'push' and 'pull' factors respectively. In most of the cases of household moves in the Serengeti district, 'push and pull' factors may have operated together and with interactive effects: for example, many households moved for more and better land because they also were unable to satisfy their needs for food and income in their previous

village of residence; in some other cases, illness and death in the family compelled people to move to another village in search for land to settle on and cultivate.

Households moved mainly for reasons associated with 'push' rather than 'pull' factors. Fifty (65.8%) of the 76 households stated reasons that were of the 'push' type. The most important 'push' factors were the insufficiency of resources, illhealth and deaths, and the insecurity associated with the socio-political conflict. The inability to satisfy the household needs of food and income was a significant factor associated with migration for improved accessibility to land, fertile soils and pasture. Twenty seven of the households (35.5%) were unable to obtain their food needs, attributed mainly to drought and the destruction of cassava by a mealy bug; thirteen (17.1%) households were unable to obtain their needed income; and, twelve households (15.8%) were unable to obtain both the needed food and income in their previous places of residence.

The failure to satisfy food needs in particular, and social and psychological impacts of illness and death appeared to be important factors in triggering migration. The migration of twelve (15.8%) of the 76 households was associated with the death of family members and the consequent search for land and security among relatives, and clan members. In contrast, movement because of 'pull' factors, for example for access to more and better land and pasture and for family reunification, were stated by 14 households (15.8%).

Thomas (1954) has observed that drawing up a list of factors labelled as 'push' and 'pull' and describing them does not constitute a causal theory of migration. The validity and problems of classifying the reasons stated for household migration into 'social', 'resources' and 'social-resources' categories was explored using analysis of variance (Cadwallader 1992). Overall, it was expected that households moved because of more specific and underlying differences in their possession of resources, their level of satisfaction with the resources possessed and social relations, their perceptions of the village environment and its hazards, and their evaluation of life, economic, food and social situations relative to that of the majority of the other people in the village of origin (Connell et al. 1976, Findley 1987).

The three groups of migrant households were expected to differ significantly on the various resource, social, ecological and life measures. More specifically, it was expected that households moving for 'resources' reasons would rate their access to and ownership of different resources less favourably than households that moved because of 'social' reasons which would instead rate their social relations and security less favourably. The group of households that moved because of 'social-resources' reasons was expected to rate their satisfaction with social relations, availability of resources, etc., at levels intermediate between those of the other two groups of migrant households. The ratings were made on a five point scale assessing satisfaction (from most dissatisfied to most satisfied) and availability (from very scarce to easily available). Comparisons between households in the three groups of reasons for migration did not indicate significant differences in the amount of total land and land per capita cultivated by households, the number of crops grown, the ownership of cattle, sheep and goats (shoats), and oxen, and the average and farthest distance to their plots of land (results not tabulated). Thus, hypothesis 9 could be accepted. Neither were there significant differences between the groups of households in their ratings of security, availability of water and wood, access to schools, clinics, and transportation services, in their perceptions of the risk to human health and rainfall conditions in the village and the average fertility of their plots of land (results not tabulated). Thus, hypothesis 10 could be accepted except as applied to the ratings of satisfaction of households moving for the main reasons with the amount of land cultivated and the environmental situation in their villages. Significant differences were found between the households of the three groups on their rating of satisfaction with the amount of land they cultivated ($\chi^2=7.336$, $df=2$, $p=0.026$; $F=6.886$, $df=2,52$ $p=0.002$) and the overall environmental situation in their villages ($\chi^2=4.465$, $df=2$, $p=0.107$; $F=4.262$, $df=2,48$ $p=0.02$). Contrary to the expectation that households relatively dissatisfied with their land would therefore move for 'resources' related reasons (for more and or better land), households that moved for 'social' reasons rated their satisfaction (mean=3.55) with the amount of their land lower and significantly different ($p=0.018$) from that of households which moved for 'resource' reasons (mean=4.35). Similarly, households that moved for 'resource' reasons expressed a greater satisfaction

with the village environment (mean=3.96) and significantly different ($p=0.02$) from that of the group of households that moved for 'social-resources' reasons (mean=3.09). This suggested that some of the mobility for 'resource' reasons was for social mobility rather than because of dis-satisfaction with their resource situation.

Households were also queried about their perceptions of their resource, social, economic, food and life situations when compared to the majority of the other people living in the village, that is an evaluation of their relative deprivation (Stark 1984, Rao 1986) in the village community. The rating of relative deprivation was also made on a five point scale (from much worse off to much better off). It was expected that people moved because they considered themselves 'deprived' relative to the other members of the village community. More specifically, households that moved because of 'resources' related reasons, for example, were expected to rate their assessment of relative deprivation higher on resources than that of households that migrated because of the other types of reasons.

The three groups of households did not significantly differ in their evaluation of the relative amounts of land and livestock possessed (results not tabulated). Neither did the groups differ in their satisfaction with intra-family relations, and relationships with others (relatives, neighbours, the rest of villagers and the village leadership), or in the quality of life, income, and food sufficiency in comparison with the majority of other villagers (results not tabulated). But households in the three groups significantly differed only in their comparison of the fertility of soils of their cropland vis-a-vis that of the majority of other households in the village ($\chi^2=18.118$, $df=2$, $p<0.001$; $F=3.425$, $df=2,53$ $p=0.04$). The group of households that moved for 'resources' reasons rated their soil fertility slightly worse (mean=2.6), households that moved for 'social' reasons rated their soils as neither better or worse (mean=3.0), and those who moved for 'social-resources' reasons rated their soils as slightly better in fertility than that of the majority of other households in the village (mean=3.1). Natural endowments and labour inputs would be the main causes of soil fertility variations. Thus, hypothesis 11 could be accepted except as applied to the ratings of relative deprivation in soil fertility between the three groups of households moving for the different main reasons. Overall,

perceptions of relative deprivation were not an important reason to migrate.

The relative significance of 'push' and 'pull' factors in household migration could be assessed also by the likelihood of households to move in specific conditions of constraints (e.g. lack of land, water, security, etc.) vis-a-vis the likelihood of household migration to improve access to resources and conditions of living (e.g. more land, more food, more security, etc.). The 173 households (76 migrant and 97 non-migrant) in the household-level survey were queried about the likelihood of migrating in specific situations (Table 6.10).

Table 6.10 Likelihood of Household Migration for Specific Reasons

Reason	No	%	Yes	%	Maybe	%	Don't Know	%
Lack of:								
Food	77	45.3	74	43.5	10	5.9	9	5.3
Income	125	73.5	26	15.3	9	5.3	10	5.9
Land	65	38.2	90	52.9	10	5.9	5	2.9
Pasture	101	59.4	55	32.4	7	4.1	7	4.1
Water	75	44.1	85	50.0	5	2.9	5	2.9
Wood	131	77.0	27	15.9	4	2.4	8	4.7
Security	56	32.9	104	61.2	4	2.4	6	3.5
To Increase:								
Food	119	70.0	29	17.1	12	7.1	10	5.9
Income	123	72.3	27	15.9	10	5.9	10	5.9
Land	115	67.6	33	19.4	9	5.3	13	7.6
Pasture	122	71.8	25	14.7	10	5.9	13	7.6
Water	126	74.1	25	14.7	7	4.1	12	7.1
Wood	147	86.5	8	4.7	6	3.5	9	5.3
Security	114	67.0	36	21.2	8	4.7	12	7.1
Harvest	122	71.8	27	15.9	6	3.5	15	8.8

Note: Percentage totals across for each variable may not add to 100 because of rounding error.

Source: Household Survey, 1991.

The results suggested that 'push' factors, associated with constraints in living conditions in villages of residence, were relatively more likely to shape household migration decisions than 'pull' factors associated with a desire to improve living conditions by migrating to other villages. Three of the 173 households did not respond

to the query; three (1.8%) households stated that they would move for any of the reasons, and twenty six (15.3%) households indicated that they would not move for any of the reasons.

Among the potential 'push' factors, the inability of a household to satisfy its basic human needs (security, food, water, land) had a 50% or more likelihood to motivate the household to migrate while the failure to obtain enough income and wood had a less than 20% chance of causing migration. Among the 'pull' factors, migration to increase security was the most important reason and household moves to increase the availability of food, water, land, pasture, and harvests were almost equally important. Movement of households was most unlikely because of the lack of wood, and to increase access to wood. However, the likelihood of moving because of 'pull' factors, even those related to satisfying basic human needs, was around or less than 20%.

The differences in the relative importance of 'push' and 'pull' factors as causes in the potential migration of households may have been affected by lesser knowledge about living conditions (Conway and Shrestha 1981) and uncertainties in obtaining more resources and security in other villages. There was less certainty among households about moving to acquire more resources and security than in situations when they lacked needed resources and security. The dominance of security as a cause of potential migration may have been reinforced by the socio-political conflict that afflicted the Serengeti area since 1985. The lack of land, food and water was almost thrice as likely as the prospects of increased availability of land, food, water and harvests to motivate households to choose migration.

The significantly lower importance of income as a factor in rural based migration contrasted the dominant role assigned to it as a motivation in microeconomic models of migration (DaVanzo 1981). Overall, the failure to satisfy basic needs in places of residence, rather than expectations of higher incomes in other locations, dominated the household assessment of migration as an option. In Serengeti district, most of the migration was to satisfy basic human needs for survival. Some migration did occur for social mobility, for example, to obtain more land and land of better fertility, for more pasture, and to increase social and psychological well-being. But such improvements

were also aimed at securing basic human needs rather than greater income and material needs. In addition, the movement of households had apparently more to do with assessments of personal and household utilities and less with the calculation of place utilities.

Overall, the processes of migration in the Serengeti area cannot be disassociated from the vital demographic processes, particularly mortality and morbidity. Prothero (1965) and Ford (1971) have shown that diseases and death have been, and are significant causes of migration in many parts of Africa. Migration also can facilitate the spread of diseases. Behavioural models of migration, for example those based on economic motivations or value expectancy (De Jong and Fawcett 1981), need to consider more thoroughly how the immediate and long term effects of morbidity and mortality can be incorporated into the evaluation of place utility or value expectancies (positive and negative). Such utilities would have to be assessed for persons and of places jointly because the individual and household incidences of morbidity and mortality would not be independent of the place characteristics and its rates of morbidity and mortality. How value expectancies would be computed for the morbidity or death of particular members of a family would be a significant challenge. Catastrophe statistics may be more appropriate for modelling the impacts of famines, floods, etc., that result in illness and death that compell migration.

6.3 Reasons for Household Migration and Distances Moved

The distances (km) moved by households for various reasons were calculated from measurements on maps using information about the means of transportation households had used in their migration between the places of origin and destination. For the 76 migrant households, the main means of getting to the village of destination was by walking (56.6%); by taking a bus and then walking the remainder of the way (27.6%). Only 7.9 % of the migrants hired a pick-up or car to relocate, and 6.5% obtained a ride on a private or government vehicle.

Distances between villages within the Serengeti and neighbouring districts of the Mara, Mwanza and Shinyanga regions were measured from 1:250,000 scale regional maps of villages. Distances from locations of origin elsewhere in the country to

destinations in the Serengeti district were calculated using a map of Tanzania at a scale of 1:3 million. It was assumed that migrants would travel to minimize distances along various roads and tracks unless impeded by barriers like the Serengeti National Park which does not allow people to walk or bicycle through it. In such cases, distances were calculated using the roads and tracks around the national park. The average of three distance measurements was used for every origin and destination of household migration.

The moves made by households as return migrants and for reasons of employment were excluded because of their small sample sizes. The four households that moved because of 'environmental' reasons were re-classified because of the small sample size: three households were assigned to the 'resources' category since their move was mainly for resources (land) to avoid flooding and wildlife damage; and the household that moved for a change of environment was deemed to have moved for social and psychological reasons. The average and ranges of distances (km) moved by households for each of the three categories of reasons for their migration are shown in Table 6.11.

Households moving for land and other agricultural resources were expected to move significantly shorter distances because such resources are more ubiquitous than the availability of 'social and psychological' resources like members of family and other

Table 6.11 Mean Distances Moved (km) for Main Reasons of Migration

Reasons	Mean	Stad. Dev	N
Social	45.1	49.7	25
Resources	42.2	66.4	27
Social-Resources	25.3	17.2	14
Total	39.7	52.5	66

Note: Stad. Dev = Standard Deviation
Source: Household Survey, 1991.

relatives. Those moving for 'social-resources' reasons were expected to move distances that on the average were intermediate between those that moved for the two other main types of reasons. The results indicate that the mean distances moved by households for

'social', 'resources', and 'social-resources' reasons were not significantly different (Bartlett's $\chi^2=20.467$, $df=2$, $p<0.001$; $F=0.669$, $df=2$, 63 ; $p=0.516$). Thus, hypothesis 8 could be accepted.

6.4 The Sources of Information and Alternative Destinations

Migrants obtained information about the village of destination from several sources as shown in Table 6.12. An overwhelming majority had been to the village of migration destination, either having visited it once or several times for different reasons such as visits to family, relatives, friends and even purposes like going to market, to grind grains at a mill, and to get medical assistance. The next most important source of information was blood relatives or relatives through marriage living in the village of destination. But very few migrants derived their information from friends living in the village and in places of much interaction such as markets. The contacts with family and friends were

Table 6.12 Sources of Information about Migration Destination

Source of Information	Number of Households	%
One visit	10	13.2
Visits	35	46.0
Family	17	22.4
Friends	2	2.6
Market	1	1.3
Return Migrants	6	7.9
Other	4	5.3
Unstated	1	1.3
Total	76	100.0

Source: Household Survey, 1991.

made in places other than the village of destination. Return migrants had information out of their own direct experience of having lived there previously.

Very few migrant households considered more than one village as potential destinations for relocation. Sixty seven (88.2%) of the 76 migrant households interviewed

did not consider any other village as a destination. They only considered and then moved to the village they were living in at the time of the study. This includes the return migrants. Only seven (9.2%) households first considered an alternative destination, all rural, and then moved to their current village of residence. Two households stated that they moved to the village out of no choice: one household of a sick woman and her two little children did so because the village was the only one whose government was willing to grant residency after being rejected by another village; the second household did not elaborate its reasons.

6.5 The Duration and Mode of Household Relocation

The migratory moves made by households between the villages of origin and destination generally took a very short period of time. Sixty one (80.3%) of the 76 households moved directly within a day to their migration destination, six households (7.9%) stayed overnight enroute in the process of moving, and only four (5.3%) households moved over a period of a month to a year. Five households (6.6%) did not state the length of the period it took for their move from the place of origin to the destination of migration.

The short duration of the process of relocation reflected the mainly local and relatively short distance, rather than inter-regional and long distance, characteristic of rural-rural migration in the Serengeti district. It also suggested that movement was strongly destination oriented, aimed at overcoming the distance between the origin and destination as an intervening obstacle (Lee 1966) rather than as a source of intervening opportunities (Stouffer 1940, 1960) that may be exploited by a migrant hopping among villages to find resources for subsistence and survival. Only one of the 76 migrant households had sought residence rights in a village other than the one it was living in after having departed from its place of origin.

Households moved using different combinations of its members in the process of their relocation. In the case of almost two thirds (69.7%) of the households, all its members moved together; the head of the household preceded in the case of eleven (14.5%) households; the parents from three households (3.9%) moved first to the

destination village; and the male and the female parent moved with a part of the household in three cases (3.9%) each. A wife from two households (2.6%) moved first and alone to the destination village. The relocation process of one (1.3%) household could not be clearly ascertained.

6.6 Migration and Village Government Policies

The importance of personal knowledge and family as sources of information and the tendency of migrants to consider a specific or only few potential destinations for migration are better understood when examined in the context of the policies of village governments towards migration, land allocation, and establishing a homestead. A household's decision to move to a particular village was contingent upon acceptance by its government to grant residency rights within the village community and to allocate land for cultivation. A village government policy towards migration and land allocation differed according to its particular population and resource situation, and in some instances, in the context of clan territoriality and memberships of migrants.

Previous visits to and familiarity with the resource situation in potential villages of destination contributed to the process of migration decision-making and thus the choice of a destination. Village governments often required people applying to become in-migrants to provide a written testimonial from their villages of origin. The presence of family and friends who could sponsor and promote the application, and vouch for the good character of the potential in-migrant also improved the likelihood of an applicant being accepted for residency. They also provided support needed in the processes of relocation, adjustment and integration in the village of migration destination. Some village governments, e.g. Romchanga, allowed in-migrants under a probation period of upto 5 years of good conduct and citizenship before granting complete residence rights. Good citizenship included participation in the village's collective activities such as security patrols, repairing and building schools, clinics, etc. as well as not being engaged in criminal activities like stock rustling, banditry and theft.

The duration and process of screening applicants for in-migration varied individually. It was also influenced by other factors such as the ability of an applicant to buy the

homestead of a person moving elsewhere within or out-migrating from the village of potential destination, or if the applicant had been assigned by district authorities to work in the village, for example as teachers, health workers, within village government, etc. Those assigned to work in the village got land without screening and delay. An in-migrant who had purchased the homestead of an out-migrant was more likely to be allocated the out-migrant's cropland. However, in-migrants could not buy land from village residents or an out-migrant. The sale of land by individuals is prohibited as the land is collectively owned by the village and its allocation is under the legal jurisdiction of the village government. Land may be shared, inherited, loaned, exchanged, cleared and used for farming, etc., only with the consent of the village government. Land allocation is usually carried out by a specific committee of the village government, and sometimes by the whole government. While there were no specific committees on 'migration issues', the role of a village government in approving residence rights and allocating land controlled who was accepted and regulated the rate of in-migration into a village. This process, in turn, influenced the characteristics and maintained the different types of migration fields noted in chapter five.

Village governments in the Serengeti district practised different policies towards migration (Table 6.13) mediated mainly through the mechanisms of land allocation, and as influenced by their specific resource situations and the rate of out-migration.

While no village government stopped in-migration or out-migration, the land availability situations and the allocation policies had, in the majority of cases, regulating effects on in-migration. These effects were in addition to the other screening criteria applied directly, e.g. testimonial of good conduct and citizenship, or indirectly, e.g. clan and ethnic affinity, in accepting in-migrants.

Villages also had specific problems associated with in-migration. Some people had moved into Romchanga by force and without the consent of the village government since the area was good for growing maize. The village council did not have enough power to deal with the problem. The village of Matare settled in-migrants on its boundaries to stop encroachment into its area by residents from neighbouring villages. Merenga and Machochwe were negotiating the boundary between them at the time of the village

Table 6.13 Village Land Situations, Allocation Policies and Effects on In-migration, Serengeti District

Villages	Land Situation	Land Allocation Policy
Robanda Nyichoka Singisi Nyankomogo Nyakitono	Plenty or More than enough	Unutilized land given to in-migrants; No regulation of migration
Merenga Romchanga Iharara Makundusi	Some Still Available	Unutilized/out-migrant's land given to in-migrant, Out-migrant's land may be used temporarily by a resident; In-migration partially regulated by out-migration
Matare Motukeri	Just Enough	Out-migrant's land given to in-migrant; In-migration regulated by out-migration
Nyamakendo Machochwe Nyamburi Bwitengi Gesarya Itununu Kebanchebanche	Not Enough	Out-migrant's land given first to resident short of of land and then to in- migrant, Land pressure leading to out-migration; In-migration regulated by out-migration
Koreri	Very Scarce	Out-migrant's land given first to resident short of land and then to in- migrant; In-migration strongly regulated by out- migration No policy to stop in-migration or promote out-migration

Source: Village Survey, 1991.

survey. The villages of Nyamburi, Nyamakendo, and Machochwe that abut the Serengeti National Park claimed a shortage of land, out-migration because of land pressure, and a desire for additional land within the Serengeti National Park. Projects aimed at demarcating village land need to take into consideration the views and agreements reached by villagers about land and its use, both within and between villages.

The demands for more land by residents adjacent to the park boundary in the north have gained momentum since the incorporation of the Lamai Wedge between the Mara

River and the Tanzania-Kenya frontier into the Serengeti National Park. These areas, like the rest of the hills/highlands had higher rates of natural increase, at about 3.1% per annum as compared to 2.8% per year in the rest of the district. In contrast, Makundusi village in the south and also adjacent to the park was experiencing rapid depopulation attributed to extensive damage to crops by wildlife, the difficulties of working its heavy red clays, and disputes within the village. Depopulation continued despite Makundusi's status as the district's first 'Ujamaa' village with a fully communal agriculture, and having a school, clinic, piped water supply, tractor, grinding mill, store house, and several meritorious prizes for its development activities.

Village governments were not the only authority influencing population and resource relations within villages. During colonial rule, the territorial government often moved people to suppress rebellion and extend political control, to combat diseases and epidemics, to avoid natural disasters like floods, to promote the plantation economy, to create national parks and game reserves, and to reduce population pressures. In the post-colonial period, the national government also moved people for nearly all the same reasons and indeed, decisively altered the local pattern of population and settlement distribution in rural Tanzania through the 'villagization' programme in the early 1970's.

National legislation, by granting powers only to village governments to allocate village land, enabled village governments to affect the population-resource relationships in villages and regulate, in particular, in-migration. In contrast, no restrictions applied to in-migration into urban centres such as Mugumu town although attempts have been made in Tanzania to repatriate unemployed persons from Dar es Salaam to their places of origin and to give them land to farm and support themselves. Some families who were not registered as refugees and had not officially established Tanzanian residency returned to Kenya from Romchanga and Motukeri villages in 1990. Socio-political strife also contributed to altering the resources and population relationships in Serengeti district's villages; banditry and insecurity compelling an exodus of many households to their places of origin in neighbouring districts, for example from the village of Motukeri to the districts of Bunda and Bariadi, and from the Mugumu rural ward to ancestral, clan areas in the Tarime highlands.

The departure of a household from its village of residence and its arrival into the village of migration destination resulted in a change in the 'spatial locus' (Zelinsky 1971). This relocation initiated changes in the 'agroecological locus', the latter changes also being mediated through the changes in the spatial and social loci. These changes are examined in the following chapter.

Chapter Seven

Migration, Agroecological Change and Equity

The analysis of spatial mobility in developing countries has been approached from three main perspectives. The micro-level behavioural analysis has drawn from the 'man-environment' paradigm (Brookfield 1968). The macro-level structural analysis has implicitly been based on the 'distance-decay' paradigm (Soja 1968, Gould 1970). The third perspective has combined the two approaches by examining micro-level information in the context of structural processes like urbanization, modernization, and the diffusion and impacts of external forces, for example, capitalism and industrial technology (Zelinsky 1971, Pryor 1972, Findley 1987).

This chapter examines the inter-relation between household migration and agriculture within the 'man-environment' paradigm and its structural settings. The emphasis is on the types of changes in the 'agroecological locus' concomitant with the changes in the 'spatial locus' and the 'social locus' associated with migration, and the ways in which migration is inter-related to the processes of development in rural Serengeti district. The chapter first considers how migrants obtained land to cultivate and established a home after relocation, and examines the changes in the 'social locus' of migrants that accompanied the re-establishment of the household and its agricultural livelihood.

The second section of the chapter analyses the changes, as well as the continuity, in the agroecological system of the migrant household. It also compares and contrasts the agroecological situations of migrants, before and after moving, and the residents of their host community, especially the amount and ecological characteristics of land, the number of crops grown, the techniques of cultivation, and the sources of labour used. Multiple regression models outline the relationship between household demography and agroecology. The final section of the chapter relates migration, as a process, to the other processes of development, differentiation, and structural change in rural Serengeti district. It examines the relationship between migration and equity in household access to land and its use.

7.1 Land Acquisition and Re-establishment of Homes by In-migrants

The process of relocation of a household is followed by the processes of re-establishment, adaptation, and integration into the village of migration destination. The assimilation of the migrant into the host-community is the final step in the process of migration (Mabogunje 1970) and includes several complex adjustments in individual personality, in social and cultural interaction (Mangalam 1968), through institutional adaptations, and information diffusion to link the individual and the rest of the community and its activities (Pryor 1975).

In addition, a migrant household has to re-establish its agroecological system to feed itself and obtain a livelihood through adjustments and adaptations to its new biophysical environment, and by inter-linking its new farming activities to the socio-economic structures of its host community. These adjustments and adaptations could last a long period of time and may not even result in successful integration, thus leading to more deprivation, further migration, the dissolution of or greater mortality within the household.

The ability of a migrant household to re-establish in an agroecological system in the village of destination mainly involves the tasks of simultaneously coping with the changes in the 'spatial locus', 'social locus' as well as 'agroecological locus' associated with migration. The processes of coping with the changes in these three types of loci are interactive, cumulative but non-linear, and mediated through a migrant's spatial, social and agroecological systems within the structures, processes, development situation, and physical environment of the community.

The process of re-establishment involves the physical tasks of setting up a home, acquiring and preparing land for cultivation, acquiring the various household needs, as well as the social and psychological tasks of developing contacts and interaction networks with the rest of the village community. These contacts represent some of the changes in the 'social locus' consequent to migration (Zelinsky 1971) and become critical sources of support in the initial establishment of the household, its subsequent adjustment and adaptation to the different socio-economic and ecological conditions, and eventual integration into the village community.

Among the first of the major tasks required of a migrant in the destination village in the Serengeti district was to set up a home, and acquire and prepare cropland for cultivation (Table 7.1).

Table 7.1 Ways of Acquiring a Home and Cropland in Destination Villages: Serengeti District

Acquired Home ?	N	%	Acquired Land ?	N	%
Built/building	39	51.3	Cleared land	6	7.9
Bought	19	25.0	Allocated land	40	52.6
Bought/built	6	7.9	Bought homestead	10	13.2
Rented/renting	2	2.6	Shared by family	6	7.9
Boarding	2	2.6	Shared by friend	1	1.3
Inherited	2	2.6	Inherited	2	2.6
Allotted/rebuilt	2	2.6	Previously owned	3	3.9
Not stated	4	5.3	Not stated	6	7.9
			None obtained yet	2	2.6
Total	76	99.9	Total	76	99.9

Note: Percentages do not total to 100 because of rounding error.
Source: Household Survey, 1991.

Migrants usually began to lay the social, economic, and political groundwork involved in the tasks of setting up a home and acquiring land prior to their move, for example, by mobilizing family and other support networks, seeking information perhaps through visits, approaching or applying to the village government for permission to reside, and even negotiating the purchase of a homestead site, if necessary or feasible, etc., at the intended destination.

The majority of in-migrants built a home after relocation and were allocated land by the village government. Less than a tenth of the in-migrants cleared new land for cropping while more than a half of the total land allotted was previously cropped. Nearly a third of the in-migrants had commenced the processes of acquiring a homestead prior to their arrival in the destination village by buying a homestead site from previous or current residents of the village. The homestead site was the compound with the huts for living, grainaries, and sometimes a fenced enclosure for livestock. The site was usually purchased for a few hundred to a few thousand Tanzanian shillings (Tsh). The highest

reported sum paid was around 15,400 Tsh. and included some livestock in the purchase. In comparison, the average annual gross domestic product per capita in Tanzania was about 16,950 Tsh. in 1990 (Bureau of Statistics 1992c). Then, the exchange rate was about 200 Tsh. for the U.S. dollar.

Some in-migrants had to rebuild the huts in the homestead site that they had bought while others rented accommodation or lived with other families after their arrival. Purchasing a homestead site often resulted in an in-migrant being allocated the cropland of the seller of the homestead and represented an indirect approach to improve the likelihood of gaining residency and land in the destination village. Some 60% of in-migrants who bought a homestead site were allocated other land by the village government. The in-migrant had little or no previous knowledge of that.

Some return migrants were able to re-occupy their previous homesteads and repossess their previous cropland. Others had to rebuild their homes. Overall, few in-migrants had inherited homesteads and cropland while a significant number were sharing land with family and friends. But such sharing may have been out of desire and convenience rather than a denial of land to in-migrants by the village government.

In contrast, the residents of Maliwa, Ngamanga and Mamongolo villages (Njombe district, southern Tanzania) in 1983 had obtained 5-17% of their land from village governments, 6-11% from sharing, while 64-84% of the land was inherited. In these Njombe villages, in-migrants who moved during 'villagization' mainly borrowed land, while over 90% of the land used by the 'pre-villagization' residents of the villages was inherited (Friis-Hansen 1987).

Although a relatively small proportion of in-migrants of Serengeti district inherited and shared land and accommodation, these situations were important examples of their emerging, new 'social locus' as well as means of acquiring a livelihood. About 57% of the 76 migrant households stayed on their own after their arrival in the destination village but another 42% (32 households) lived initially with other members of the village community. Most stayed with relatives (30.3%) and immediate family (7.9%) while the rest were hosted by friends and fellow clan members. The place of stay of one family could not be ascertained.

The sources and types of assistance obtained by in-migrants in the process of establishing a home and a household agroecological system (Table 7.2) also represented examples of emerging, new ties in their 'social locus' as well as a means of coping with the change in the 'agroecological' locus. The social networks were the first crucial

Table 7.2 Use and Sources of Assistance in the Re-establishment of In-migrant Households: Serengeti District

Used Assistance	Sources of Assistance	N
No	Intra-household only	38
Yes	Family e.g. brother	6
	In-laws	3
	Other relatives	1
	Relative-neighbour	1
	Relative-neighbours-friends	1
	Relative-family-paid work	1
	Family-friends	2
	Friends	11
	Relatives-church group	1
	Family-friends-villagers	1
	Friends-paid work	1
	Paid work only	2
	Villagers	5
Not Stated		2
TOTAL		76
Used Assistance to		N
Build home		14
Build home and clear land		3
Build home and cultivate		5
Build home, clear and cultivate land		2
Clear and cultivate land		1
Oxen and/or tools		2
Oxen, tools and cultivate land		1
Cultivate land		1
Build home and loan tools		1
Food and/or board		3
Food, oxen and tools		1
Not stated		2
Total		36

Note: Values are number of households
Source: Household Survey, 1991.

foundation in the processes of re-establishment of in-migrant households in their destination villages. Half (50%) of the in-migrant households did not use any assistance from outside their own household in building a home or in initial cultivation. Two households did not state if they used any non-household sources of assistance while some households used multiple sources of help, for example, from relatives, neighbours and friends all together or from relatives, and/or immediate family who were not a part of the household, and also through paid labour.

The most important sources of help for the 36 households (47.4%) that used assistance were from friends, family members who were not a part of the household, and other relatives, and neighbours. Other villagers also assisted, and money was paid for help by only 4 households (5.3%). The most important uses of assistance were in building a home, mainly through the support of friends and neighbours, and in clearing and cultivating land, helped almost equally by extra-household family, relatives as well as friends and neighbours. Tools and oxen for farm work were borrowed mainly from relatives, friends and neighbours; other villagers also helped, with or without payment. Food, when needed, was generally obtained from family and relatives. The greater use of help in building a hut or huts reflected the urgency, among the various tasks of re-establishment after migration, of having a home in which to live.

Members of the village community, including friends and neighbours, helped each other through *msaragambo* (communal work group). Food and drink were usually provided in appreciation to those who assisted in various tasks. Members of a common church, e.g. Pentecostals, also assisted in-migrants belonging to the church. Thus, clan kinship, church membership, and the tradition of *msaragambo* supplemented family ties in mutually rendering needed assistance in various forms. These ties and activities formed components of a multi-channeled, multi-layered social network and agroecological system. Some of these ties were bound further through membership of the same age-set. For example, in Kuria tradition boys and girls at 11-12 years in age formed a mutual help society called *kisassi*. They were later initiated into the same *saro* (age-set) and continued the practice of mutual assistance.

While new contacts and ties were being established in the village of destination, in-migrants also experienced changes in their social interactions and ties to their community of origin. A majority of migrant households (Table 7.3) had members who had visited their village of origin while nearly four out of ten households had not made any visits. Those who retained contacts generally did so frequently. The presence of family and relatives were the main reasons for migrants to visit their village of

**Table 7.3 Frequency of Contacts with Villages of Origin:
Serengeti District**

Frequency	N	%
Very Many Times	3	3.9
Many Times	30	39.5
Few Times	7	9.2
Very Few Times	6	7.9
None	28	36.8
Unstated	2	2.6
Total	76	99.9

Note: % total affected by rounding error
Source: Household Survey, 1991.

origin and to get goods and services from shops and markets there (Table 7.4). Migrants also visited their previous shambas (plots of cultivated land) if they had left any growing crops, usually cassava. The failure to visit the village of origin by migrants was mainly because of the pressure of work in the place of relocation and the lack of needs or reasons to visit the place of origin. Among the majority of migrants who did not visit, the main reason were the demands of establishing and readjustment in the household agroecological system during the following two crop growing seasons after arrival.

A majority of migrant households considered it wise to have left their previous village of residence, to have moved to their present village of domicile, and did not consider returning to their village of origin (Table 7.5). Two of the 76 migrant households (2.6%) observed that their relocation was not a matter of wisdom but made out of no choice. Overall, migrants were equally convinced about the wisdom of moving

**Table 7.4 Reasons for Contacts and No Contact With Villages of Origin:
Serengeti District**

Reasons For Contacts/Visits	N	%
Visit Family	11	14.5
Visit Relatives	20	26.3
Visit Friends	3	3.9
To Market/Shops	7	9.2
Visit shambas/crops	4	5.3
Other Unspecified	1	1.3
Total	46	60.5
Reasons For No Contacts/Visits	N	%
No Time/Much Work	9	11.8
No Needs There	8	10.5
Far away/expensive	3	3.9
Recently Arrived/Not Settled	2	2.6
Other Unspecified	4	5.3
Not Answered	4	5.3
Total	30	39.4

Source: Household Survey 1991.

to their present place of domicile as in leaving their previous village although 17.1 % of the households were potential returnees to the village of origin. Collier et al. (1986) observed in their Tanzanian survey of migrants to urban and rural areas that about a quarter of those who moved never returned to visit their village of origin.

**Table 7.5 Attitudes of Migrants (% Households) Towards Their Relocation:
Serengeti District**

	Yes	No	Maybe	Don't Know
Was it Wise to Leave Previous Village ?	88.2	5.3	-	3.9
Was it Wise to Move to Village of Residence ?	88.2	2.6	-	6.6
Would Consider Return to Previous Village ?	3.9	80.3	13.2	2.6

Source: Household Survey, 1991.

The changes, objective and subjective, in access and use of land resources and community services, and in the life situations and conditions as a consequence of migration are examined next.

7.2 The Changes in the Types, Location and Amounts of Cropland

During relocation, the distance moved by a migrant household between the village of origin and destination was an intervening obstacle that had to be overcome with various costs, e.g. physical energy, psychological, and monetary. This change in 'spatial locus' also had an agroecological dimension that became most significant in the subsequent processes and decisions of establishing the household agricultural system, adjustment to the environmental change between place of origin and destination, adaptation to ecological variation in the new village, and eventual integration into the host community.

Migrants may seek to minimize the 'agroecological distance' their households had to cope with when changing their 'spatial locus' (the physical distance moved). For example, Russian immigrants to the Great American Plains (McQuillan 1991), Wasafwa migrants from the Mbeya highlands in southern Tanzania to those of Kilimanjaro in northern Tanzania, and Bihari migrants to West Bengal (Choudhury and Bhowmik 1986) sought and migrated to similar, familiar environments. Such a strategy of migration also maximized the possibilities of advantageously using their agroecological skills, experience, and technology from their areas of origin in the new destinations (McQuillan 1991).

The crucial questions, from the perspective of household well-being, were: (i) how migration was inter-related to a household's access to the amounts and types of land for cultivation; and, (ii) if migration was a successful strategy for realizing the changes in the amount and quality of land desired by migrant households of the Serengeti district. Since there were few extra-agricultural sources of income, the well-being of households was mainly determined by the dynamics of its agroecological system. The household was the most appropriate unit for the analysis of the agroecological system as the household forms the unit of production, consumption, migration, and the main link between

individuals and their larger, village community.

An additional important question from the perspective of rural development policy in Tanzania was the issue of achieving social justice and equity in access to resources. The appropriate level for assessing equity was at the individual level since households varied in size and composition. The impact of migration at the community level and social justice could be examined through differentials in the equity of access and use of land associated with migration, gender, ethnicity, intra-village power relations and the ability of households to obtain the assistance of extra-household labour and use of ox-ploughs for cultivation.

The main dimensions of the 'agroecological distance' moved by Serengeti's migrants were examined at both the macro-level and the micro-level. The macro-level analysis focused on the qualitative changes, if any, in the agroecological zones associated with migration between places of origin and destination. The micro-level analysis examined the diversity of land types on the local catena and distance to cultivation plots (shambas), the total area cultivated, the number of crops grown, and the labour sources, tools and techniques used in the agroecological systems of households that did not move, and of migrant households prior to and after moving.

Migrants who moved within and between similar agroecological environments were envisaged to have had to adjust to a smaller 'agroecological distance' and thus experience a relatively smaller change in their 'agroecological locus' than those that moved between different agroecological environments. It would be expected that there was no major change in the potential combination of crops that they could grow and neither was the change in the physical environment after migration sufficient to dictate large changes in the techniques of growing crops and livestock husbandry. Following Petersen (1958), such moves could be generally characterized as agroecologically 'conservative'. A qualitative approach to identify changes, used in the present study, is simpler and easier to understand than an entropy statistic, for example the Shannon and Weaver information statistic to measure agroecological distance and changes in the diversity of landscapes and crops cultivated.

7.2.1 Household Migration as Relocations Within and Between Agroecological Zones

At the macro-level, the migration involved relocations within, and between the three main agroecological zones (upland lakeshore, upland plateau, hills/highland) identified in the eastern Lake Victoria region. The upland lakeshore below 1,200 m in altitude has mainly lacustrine marls, flat to subdued catenary landforms, an annual rainfall mean between 600-750 mm, and could be characterized as a maize-cassava-millet-sorghum-rice-cotton agroecological zone. The upland plateau between 1,200-1,500 m in altitude has a mixture of alluvial-colluvial soils derived from sandstones and granite, a more pronounced catena with hills, rainfall between 750-900 mm, and similar cropping pattern to the upland lakeshore but with a much reduced opportunity to grow rice. The hills/highland between 1,800-2,000 m have the most pronounced catenas, and soils mainly derived from granites. The annual rainfall average is 900-1,100 mm and the area could be characterized as a maize-cassava-sorghum-banana agroecological zone. Livestock could be found in all the three zones, especially in the hills/highland.

The migration of households within and between the three agroecological zones are shown in Table 7.6. The settlements of Serengeti district are in the upland plateau and the hills-highland. The portions of the Mara river valley that can be classified as the upland lakeshore type of agroecological zone in the Serengeti district is unsettled. The majority (77.6%) of seventy six migrant households moved within and between similar agroecological zones, and the rest of the moves occurred between different zones,

Table 7.6 Migration Movements Between Agroecological Zones: Serengeti District

From	To		
	Lakeshore	Plateau	Hills/Highland
Lakeshore	0	2	2
Plateau	0	26	8
Hills/Highland	0	5	33
Total	0	33	43

Note: Values are number of migrant households
Source: Household Survey, 1991.

especially between the upland plateau and hills/highland. About a half of the inter-zonal moves were from the upland plateau to the hills/highland, and almost a third of the households moved from the hills/highland down to the upland plateau.

In-migrants from the upland lakeshore moved in equal proportions to the upland plateau and the hills/highland. Some migrants came from outside the eastern Lake Victoria region and their places of origin were categorized using the same criteria of altitude, soils and rainfall to define agroecological zones. For example, the in-migrant from Arusha was also from a hills/highland zone since Arusha lies at an altitude between 1,800-2,000 m and has a mean annual rainfall above 800 mm. However, the soils of Arusha city area are derived from more recent volcanics compared to those of Serengeti district.

Migrants who relocated, for example from the upland plateau to the hills/highland moved a greater agroecological distance and made important changes in their 'agroecological' locus. Their adjustments, adaptations and integration would usually involve subtle 'innovations' and contrary to Petersen's (1958) contention that such moves were conservative. The changes in the 'social locus' were mediated also through the needs for extra-household sources of labour, tools, etc.

Migrants from the upland plateau to the hills/highland acquired a potential to grow coffee and more reliably cultivate two food crop harvests in the year. But they also forfeited the possibility of growing cotton as a cash crop because of the wetter and cooler climate, and less suitable soils of the hills/highland. Socially, such migrants moved into an ethnically less heterogeneous area; demographically, the migrants relocated to a zone with a relatively larger average family size, a higher mean rate of fertility and a lower rate of mortality.

Migrants from the upland lakeshores into the plateau moved into areas of more rainfall, soils that were less likely to be heavy clays of lacustrine origin, and a more defined catena. While these migrants did not lose the potential to grow cotton, the possibilities for cultivating rice were reduced because of lower soil moisture retention and steeper landforms. The ethnic variability did not change significantly between the upland lakeshore and the upland plateau and their demographic regimes (birth and death rates,

age-sex structures, mean family sizes) also were quite similar. All these, and other factors like the availability of social services, security, markets and transport, interacted to shape and were in turn shaped by the agroecological systems of the households, migrants as well as those who had never moved.

7.2.2 Household Migration as Relocations on the Catena

The analysis at the micro-level presented a more specific pattern of environmental changes associated with migration and to which the households had to adjust to in establishing an agroecological system in their new village. The catena was used as the diagnostic criterion to assess micro-level changes because it forms the micro-environment of the soil-water complex in which different types of crops are grown (e.g. cassava usually on sandy, ridge-top soils), influences the types of cropping techniques used (e.g. inter-cropping, rotation, ridging), the measures undertaken to protect (e.g. erosion and vermin control) and enhances the crop growing environment (e.g. manuring, weeding), and also determines the effort (e.g. household labour, *msaragambo*, paid work) and tools (e.g. hoe, ox-plough) required to cultivate crops.

For a farmer, the possession of cultivation plots (*shambas*) on different parts of the catena provided a diversity of habitats crucial in growing a variety of crops, and in reducing agricultural risk while providing a means of adapting to local environmental variation, both spatial and temporal (Porter 1965, Silberfein 1989, Binns 1992). In Serengeti district, the catena, as noted in chapter three, could be generally sub-divided into five constituent landforms: the ridge-top, upper slope, middle slope, lower slope and the drainage area (*mbuga*). For example, the sandy soils of the ridge-top and upper slope were easier to work but had relatively lower moisture retention and thus were usually put under fast growing crops (e.g. yams, maize) or crops with relatively lower moisture requirements (e.g. cassava, millets). The *mbuga* clays which were heaviest and most difficult to cultivate, often cracked when dry and could water-log during heavy rains were used for banana, rice, vegetables and pasture. For simplicity, each catena location can be regarded as a particular type of land or crop growing habitat.

An analysis of the seventy six households before and after migration showed that a

majority of the households had a complete or some change in location, (thus micro-environment), of their plots on the local catena. Thirty one of the migrant households (40.8%) had completely different catena locations or types of land for their plots, twenty two households (28.9%) had some land types that differed while the rest was the same, and only five households (6.6%) had the same types of land for cultivating before and after relocation. The types of land owned by the rest of the eighteen households could not be determined because they had not as yet begun cultivation or did not farm in their previous place of domicile (14.5%), or could not recall clearly the locations of their previous plots (9.2%) on the catena.

There were also changes in the diversity of land types of household cultivation plots after migration. A household could have all its plots on the same catena location, that is the same land type ($P_{diverst}=1$) or dispersed through the five different catena locations or land types ($P_{diverst}=5$). If a plot was located partially on the ridge-top and the rest was on the upper slope, then the plot diversity was 2 ($P_{diverst}=2$) since the plot extended over two land types. It was expected that in-migrant households differed significantly in their access to different land types for their cultivation from those that had not moved because in-migrants could not choose, as much for catenary diversity, the land that was available for cultivation. It was also expected that households with access to fewer land types for cultivation plots had moved.

The plot diversities for non-migrant, and migrant households (before and after moving) are shown in Table 7.7. The plot diversities for two non-migrant households, eight households before and eleven households after migration were unknown. There were significant differences in the average number of land types on the catena cultivated by non-migrants, and migrants before and after moving ($F=6.78$, $df=2$, $p=0.001$). Non-migrant households were using, on the average, more land types for farming than migrant households before moving ($p=0.003$), and after relocation ($p=0.011$). The migrant households did not differ significantly in the average number of land types on the catena they cultivated before and after moving ($p=0.927$). Thus, sub-hypothesis (v) of hypothesis 12 could be rejected as applied to the differences in the average number of land types on the catena cultivated by non-migrant households, and migrant households

before and after moving. But the sub-hypothesis could be accepted as applied to the differences in the average number of land types cultivated on the catena by migrant households before and after moving.

Table 7.7 Diversity of Cultivation Plots (Pdiverst) for Households: Serengeti District

Group	Catenary Plot Diversity (Pdiverst)									
	1		2		3		4		5	
	N	%	N	%	N	%	N	%	N	%
Non-Migrant	35	36.1	37	38.1	9	9.3	8	8.2	6	6.2
Migrants Before Move	42	55.3	19	25.0	5	6.6	0	0.0	2	2.6
Migrants After Move	40	52.6	13	17.1	11	14.5	1	1.3	0	0.0
	Total		Mean		Std.Dev.		%CV			
Non-Migrant	95		2.08		1.173		56.4			
Migrants After Moving	65		1.63		0.868		53.3			
Migrants Before Moving	68		1.56		0.794		50.9			

Source: Household Survey, 1991.

Sub-hypothesis (vi) of hypothesis 12 could also be accepted since none of the three groups of households were making exclusive use of a particular type or group of land types on the catena. The changes associated with migration in access to and the use of different types of land on the catena at the household-level indicated that the number of land types or catena locations of plots decreased for 15 migrant households (19.7%), remained the same for 24 households (31.6%), and increased for 17 households (22.4%). The changes in land types for the rest of the households could not be identified. The range of change for households was from a loss of two land types to a gain of three land types. The majority of households, 25 of the 32 (78%) total households, that changed their plot diversity had a gain or loss of one type of catena location.

Overall, non-migrant households were using a wider ecological range for farming than migrants, both before and after moving. Households that migrated did not

significantly alter their ecological range for farming by moving. Thus, in-migrant households were relatively worse off than non-migrants in their access to different types of land on the catena to grow crops. Migrants were unable to significantly change their accessibility to a greater variety of land types that would potentially enable them to spread agricultural risks or grow crops whose habitat requirements were different.

The loss of ecological diversity for cultivation can be disadvantageous for a household while a gain may be advantageous by providing opportunities to grow a greater variety of crops, to adapt to local ecological variation by staggering planting with trends in intra-seasonal rainfall, by spreading the demands of labour, and allowing the fallowing of some plots as required. It was expected that non-migrant households, with a greater diversity of land types on the catena, would grow a larger number of crops than migrants after their relocation and that migrant households were also growing fewer types of crops before moving when compared to households that had not moved. These differences would be associated with the lesser diversity of land types available to migrant households, before and after moving.

The most important crops grown in Serengeti district are maize, cassava, sorghum, yams, and finger millet. Cotton is the only non-food, cash crop and only grown in the upland plateau. Generally, food crops are also bought and sold in local markets. Locally, beans, bananas (e.g. in Kebanchebanche), rice (e.g. in Bwetengi), and maize (e.g. in Romchanga) may also be important.

The diversity or number of crops grown by households that moved and did not move showed significant contrasts (Table 7.8). The differences in the average number of crops grown by the three groups of households were significant ($F=5.64$; $df=2, 225$; $p=0.004$). The difference in the average number of crops grown by non-migrant households and migrants after relocation was significant ($p=0.052$); the difference between non-migrant and migrant households before their relocation was also significant ($p=0.004$). Thus, sub-hypothesis (ix) of hypothesis 12 could be rejected as applied to the differences in the average number of crops grown by non-migrant households, and migrant households before and after moving. However, migrant households did not differ in the average number of crops they grew after and prior to relocation ($p=0.739$).

Hence, sub-hypothesis (ix) could be accepted as applied to the differences in the average number of crops grown by migrant households before and after moving. Overall, non-migrant households grew, on the average, one more crop than migrant households. Households grew an average of three crops in other parts of Tanzania (Collier et al. 1986).

Table 7.8 Number of Crops Grown By Households: Serengeti District

Number of Crops	Household Groups Number and Percent of Households					
	Non-Migrant		Migrant			
	N	%	After Moving N	%	Before Moving N	%
Unknown	1	1.0	9	14.5	9	11.8
1	4	4.1	5	6.6	6	7.9
2	17	17.5	16	21.1	22	28.9
3	23	23.7	16	21.1	11	14.5
4	15	15.5	11	14.5	15	19.7
5	19	19.6	11	14.5	8	10.5
6	9	9.3	3	3.9	3	3.9
7	2	2.1	3	3.9	2	2.6
8	4	4.1	0	0.0	0	0.0
9	1	1.0	0	0.0	0	0.0
10	2	2.1	0	0.0	0	0.0
Total	96	100.0	65	100.1	67	99.8
Mean	4.1		3.4		3.2	
Std. Dev.	1.95		1.55		1.50	
%CV	47.9		45.2		47.0	

Note: Percent total affected by rounding error
Source: Household Survey, 1991.

Linear regressions indicated that the number of crops grown by households (non-migrant and migrant, before and after moving), was positively correlated with the number of land types households had on the catena (Table 7.9). Each of the regression models and the values of the parameters (a, b) were significant at probabilities of 0.02 or less. All households grew, on the average, about twice as many crops as the diversity of their plot locations, or land types on the catena. Non-migrant households grew a slightly larger number of crops than migrants, before and after moving, for an equal change in the number of land types.

The in-migrant households had a slight reduction in the number of crops they cultivated for the change in land types on the catena. Overall, a majority of households altered the number of crops they grew after relocation. The number of crops cultivated after relocation decreased for 19 households (25%), remained the same for 15 households (19.7%), and increased for 24 households (31.6%). The trend for 18 households (23.7%) could not be determined. Nearly 80% of households reduced or increased by 2 types the number of crops that they raised after migration.

Table 7.9 Relation Between Number of Crops Grown and Diversity of Land Types on the Catena: Serengeti District

Group	N	R	R ²	SEEst	a	b
Non-migrant	95	0.424	0.171	1.781	2.589	0.707
Migrants After Move	65	0.296	0.073	1.493	2.588	0.522
Migrants Before Move	64	0.320	0.088	1.439	2.270	0.607

Source: Household Survey, 1991.

The degree and changes in land types possessed by households had major impacts on the cropping patterns of households. The changes in the number of land types used and number of crops grown by households, after migration, were positively and significantly correlated ($n=55$, $r=0.353$, $p=0.008$). The relationship between the changes in the crop diversity (CCDIVERS) and the changes in land types (CPDIVERS) could be modelled as follows:

$$\text{CCDIVERS} = 0.201 + 0.482 \text{ CPDIVERS};$$

The linear regression model had an adjusted $R^2=0.108$, a Standard Error of Estimate=1.571; and $F=7.54$, $df=1, 53$, $p=0.008$. While the value of t for the intercept was not significant ($p=0.348$), that for the slope was significant ($p=0.008$). The changes in the diversity of land types and numbers of crops grown by the migrant households were unrelated to the distances moved, or their major reasons (for resource needs, social, and resources-social) for moving.

The most important food crops grown in Serengeti district are cassava, maize, sorghum, yams, and finger millet. Cotton is the most important cash crop. There were no significant differences in the proportions of total area cultivated with most of the major food crops except finger millet, by households before and after moving; there were also no significant differences in the mean proportions of total cropland allocated to cotton cultivation by non-migrant, and migrant households before and after moving (results not tabulated). Migrant households allocated about 37% of the total area they cultivated to finger millet production before moving and about 29% of the total area after moving. Non-migrant households used an average of about 26% of the total area they cultivated to grow finger millet. Among households that grew finger millet both before and after migrating, the average proportion of total area devoted to the cultivation of finger millet decreased significantly after relocation ($t = -2.216$, $n = 12$, $df = 11$, $p = 0.049$). The reasons for this reduction could not be determined. Thus, hypothesis 16 could be accepted as applied to the differences in the mean proportions of total area allocated to cassava, sorghum, maize, yams and cotton production by non-migrant and migrant households, both before and after moving. But, the hypothesis could be rejected as applied to the differences in the mean proportions of cropland allocated to finger millet production among households that grew finger millet before and after migration.

The movements of migrant households within and between the agroecological zones could also be conceptualized as relocations on the catena, but at a regional spatial scale. For example, migrants moving from the upland lakeshore to the plateau zone relocated from the lower slope and mbuga to the mid-slopes, and those moving from the plateau to the hills/highland relocated their catenary locus from the middle slopes to the upper slopes and ridge-tops. The movement from the upland lakeshore and plateau to the hilly, highland was most significant in altering the potential cropping opportunities for households. Eight households (10.5%) lost the potential to grow cotton by moving from the upland plateau to the hills/highland, while five households (6.6%) gained the potential to grow cotton by moving from the hills/highland to the upland plateau.

However, the changes in the agroecological zone and catena habitats, and the potential types and number of crops grown by households were not the only changes in

the 'agroecological locus' associated with migration in the Serengeti district. Whether there were also changes in the distances to plots and total amounts of land for cultivation and how these were related to the types of land on the catena owned by households are examined next.

7.2.3 Household Migration and the Changes in Distances to Cultivation Plots

The distance from home to cultivation plots has been identified as an important factor constraining agricultural activity in rural Tanzania, especially after 'villagization'. It has been argued that the increase in population densities from settlement consolidation and population growth have made easily accessible land scarce. As farmers have had to cultivate plots at greater distances from their homes, their labour inputs and intensification of land use in more distant plots have decreased, and some of these plots have been abandoned (Collier et al. 1986). Friis-Hansen (1987) observed that 67% of the people in Maliwa and 78% in Ngamanga villages who did not move during 'villagization' had their plots within 30 minutes walking distance of their homes; those who had moved had 72% and 50% of their fields located between 31 minutes and 3 hours and 30 minutes. But the study did not differentiate between distances to the nearest plots of land, which are often attached to the homestead site, and others at a distance.

In Serengeti district, the distances to cultivation plots were estimated, in walking time (minutes), by the household respondent during the survey. The estimated walking time to household plots was not calibrated against measured time since there was not enough manpower to visit the many plots at different distances. Since many households had plots around the homestead and also farther away, the average and variation in walking time to the nearest and farthest plots cultivated by households were computed (Table 7.10). If a household had a single plot, for example attached to the homestead site, the walking time to its nearest and farthest plot was the same.

The differences in the range and average of distances to the nearest plots of non-migrant, and migrant households, before and after moving, were significant (Bartlett's $\chi^2=78.3$, $df=2$, $p<0.001$; $F=11.175$, $df=2$, 206 ; $p<0.001$). The average walking time

to the nearest plots was the longest for households before moving and the shortest after migrating (Table 7.10). The nearest plots of migrant households before moving were on the average almost thrice the distance as after moving and about two and a half times the distance as households that had not moved. The variation in proximity of the nearest plots was relatively most favourable to households before migration and least favourable

Table 7.10 Walking Distance (Minutes) to Household Plots: Serengeti District

Walking Distance	Non-migrant		Migrant			
			After Moving		Before Moving	
	N	%	N	%	N	%
Nearest Plots:						
up to 5 min	60	65.2	39	69.6	27	44.3
5.01-15.00	18	19.6	10	17.9	13	21.3
15.01-30.00	12	13.0	6	10.7	8	13.1
>30.00 min	2	2.2	1	1.8	13	21.3
Total	92	100.0	56	100.0	61	100.0
Mean (min.)	9.7		7.7		24.7	
Std. Dev.	15.8		11.6		34.2	
%CV	162.9		150.6		138.5	
Farthest Plots:						
up to 5 min	30	32.3	28	50.0	17	27.9
5.01-15.00	28	30.1	12	21.4	12	19.7
15.01-30.00	23	24.7	11	19.6	11	18.0
>30.00 min	12	12.9	5	8.9	21	34.4
Total	93	100.0	56	99.9	61	100.0
Mean (min.)	20.8		13.9		42.6	
Std. Dev.	24.2		16.6		51.0	
%CV	116.3		119.4		119.7	

Note: Some percentage totals affected by rounding error
Source: Household Survey, 1991.

to the households that had not moved. The non-migrant and migrant households after relocation did not differ in the average distance to their nearest plots of land ($p=0.852$); the households that had not moved were on the average closer to their nearest plots than migrant households before they moved ($p<0.001$); and households that migrated significantly differed in the average distance to their nearest plots before and after moving ($p<0.001$). Thus, sub-hypothesis (iii) of hypothesis 12 could be accepted as

applied to the difference in the average distance to the nearest plots cultivated by non-migrant households and migrant households after relocation. But the sub-hypothesis could be rejected as applied to the differences in the average distances to the nearest plots cultivated by non-migrant households and migrant households prior to their move. Sub-hypothesis (iii) of hypothesis 12 could also be rejected as applied to the difference in the average distance to the nearest plots cultivated by migrant households before and after moving.

The differences in the average and variation in distances to the farthest plots (Table 7.10) belonging to the three groups of households were significant (Bartlett's $\chi^2=79.75$, $df=2$, $p<0.001$; $F=12.572$, $df=2$, 207; $p<0.001$). The most distant plots, on the average, had belonged to households before moving: these plots were at more than twice the average distance as compared to the farthest plots belonging to households that had not moved, and about three times the average distance of the farthest plots owned by households after migrating. Households that did not move and migrant households after relocation did not differ significantly ($p=0.424$) in the average distance to their farthest plots. Thus, sub-hypothesis (iii) of hypothesis 12 could be accepted as applied to the difference in the average distance to the farthest plots cultivated by non-migrant households and migrant households after relocating. Households that moved were on the average significantly nearer to their most distant plots after relocation than before migrating ($p<0.001$). Hence, sub-hypothesis (iii) of hypothesis 12 could be rejected as applied to the difference in the average distance to the farthest plots cultivated by migrant households before and after moving. The non-migrant households also differed in the average distance to their most distant plots of land than migrant households before moving ($p<0.001$). Sub-hypothesis (iii) of hypothesis 12 could also be rejected as applied to the difference in the average distance to the farthest plots cultivated by non-migrant households and migrant households before moving.

The average distance to all plots was most favourable for migrant households after relocation and least favourable for households before moving (Table 7.11). There was no significant difference in average proximity to all plots belonging to households that had not moved and migrant households after relocation ($p=0.468$). Thus, sub-hypothesis

(iii) of hypothesis 12 could be accepted as applied to the difference in the average distance to all plots cultivated by non-migrant households and migrant households after relocating. Non-migrant households were, on the average, closer to all their plots than migrant households before moving ($p < 0.001$), and migrant households were on the average closer to all their plots of land in their destination villages than in the villages of origin ($p < 0.001$). Sub-hypothesis (iii) of hypothesis 12 could be rejected as applied to the difference in the average distance to all plots cultivated by non-migrant households and migrant households before moving. The sub-hypothesis also could be rejected as applied to the difference in the average distance to all plots cultivated by migrant households before and after moving.

Table 7.11 Walking Distance (Minutes) to All Household Plots: Serengeti District

Walking Distance	Non-migrant		Migrant			
			After Moving		Before Moving	
	N	%	N	%	N	%
up to 5 min	32	34.4	28	50.0	17	27.9
5.01-15.00	35	37.6	16	28.6	12	19.7
15.01-30.00	15	16.1	8	14.3	11	18.0
>30.00 min	11	11.8	4	7.1	21	34.4
Total	93	99.9	56	100.0	61	100.0
Mean (min.)	15.7		10.8		34.0	
Std. Dev.	18.6		12.9		38.4	
%CV	118.5		119.4		112.9	

Note: Some percentage totals affected by rounding error
Source: Household Survey, 1991.

Overall, migrant households greatly improved their proximity to land to cultivate by moving, and the average distances to their nearest, farthest, and all plots were similar to that of the non-migrant farmers. The average walking time to the most distant plots for all households was almost twice that to the nearest plots. How the distances to plots were related to the total size of household land holdings is examined next.

7.2.4 Migration and the Changes in Land Ownership and Use

The need for land to cultivate has been among the dominant reasons stated by farmers for migrating and an important factor attracting migrants to rural areas (Prothero 1972, Connell et al. 1976, Abeysekera 1984, Henriques 1985, Collier et al. 1986). This was also the case with the migrants of Serengeti district (see chapter six). The area of land owned or cultivated by farmers was also a significant issue since differences in farm-sizes and productivity have been shown to be associated (Chaudhry et al. 1985). Similarly, land ownership and land holding sizes have been noted to be associated with household fertility and household size (Schutjer and Stokes 1985), and in turn with rural to urban migration in developing countries (Bilsborrow and Winegarden 1985).

In Serengeti district, the amount of land owned by a household, the land holding, is only sometimes larger than the acreage cultivated, i.e. cropped land. Generally, all the land owned by households is used (cropped and fallowed) both because of the household need as well as the likelihood that the Village Council will, when short of land, allot surplus unused land to households that need it. However, land left to fallow as part of the household agricultural system is not reallocated. Non-migrant households cultivated 98% of their total land holdings while the migrant households, before and after moving, cultivated all the land they owned. Three non-migrant households, with holdings of 20-35 acres, did not crop all the land they owned but a household with 50 acres cultivated all of it. The following analysis of land ownership and use, therefore, focused on the area cultivated by households.

The acreage of land cultivated by households, as estimated by respondents, among non-migrants and migrants after and before moving is shown in Table 7.12. The percentages of households in the acreage classes are based only on data for the known sizes of land holdings owned and cultivated. The acreages cultivated by three non-migrant households, ten migrant households before moving and nine households after relocation were unknown. Most of the migrant households had not obtained land to cultivate after arrival in their destination villages and by the time of the survey.

The area of land cultivated by non-migrant households ranged from 1-50 acres, that for migrant households after moving was from 0.25-15.5 acres, and from 0.5-55 acres

before moving. The variation in the acreage cultivated between the three groups of households was significant (Bartlett's $\chi^2=38.13$, $df=2$, $p<0.001$). Non-migrant households had a significantly larger variation in the sizes of their cultivated area than migrant households after moving ($p<0.01$) and a smaller variation in their amounts of cultivated holdings than migrant households prior to relocation ($p<0.5$). The variation in areas cultivated by households before and after moving was unequal ($p<0.01$).

Table 7.12 Acreage of Land Cultivated by Households: Serengeti District

Acreage Class	Non-Migrant		Migrant			
	N	%	After Move N	Move %	Before Move N	Move %
<1.00	1	1.1	13	19.4	7	10.6
1.01-2.00	15	15.9	13	19.4	8	12.1
2.01-3.00	6	6.4	9	13.4	7	10.6
3.01-4.00	17	18.1	6	8.9	10	15.2
4.01-6.00	23	24.5	13	19.4	19	28.8
6.01-8.00	13	13.8	5	7.5	5	7.5
8.01-12.00	13	13.8	5	7.5	6	9.1
12.01>	6	6.4	3	4.5	4	6.1
Total	94	100.0	67	100.0	66	100.0
Mean acreage	6.62		4.09		5.85	
Std.Dev. (acres)	6.37		3.45		7.64	
%CV	96.22		84.35		130.60	

Source: Household Survey, 1991.

The average amounts of land cultivated by the households in the three groups were also significantly different ($F=3.45$, $df=2$, 224 ; $p=0.035$). Non-migrant households and migrant households prior to relocation did not differ significantly in the average acreage they cultivated ($p=0.71$). Thus, sub-hypothesis (i) of hypothesis 12 could be accepted as applied to the difference in the average acreage cultivated by non-migrant households and migrant households before moving. Non-migrant households had a larger average cultivated area, by about 40%, than households that relocated ($p=0.026$). Sub-hypothesis (i) of hypothesis 12 could be rejected as applied to the difference in the average acreage cultivated by non-migrant households and migrant households after moving. The average amounts of land cropped by households before and after migration did not differ

($p=0.221$). Sub-hypothesis (i) of hypothesis 12 could be accepted as applied to the difference in the mean acreage cultivated by migrant households before and after moving. The differences in the group variances made it difficult to ascertain the significance of the changes in mean acreage cultivated before and after moving (based on Tukey's HSD).

The main effect of migration on land ownership and acreage cultivated was to reduce the variation in the amounts of land owned and cultivated by households that moved. Thus, there was greater equity among households in the size of land holdings and cropped land after relocating. But the migrant households had and cropped, on the average, less land than the households that did not move and amidst whom the migrants resettled. At the individual household level, the impacts of moving were variable: most households lost land, some gained land, while a few households had the same amounts of land before and after moving. Thirty six (58%) of the sixty two households whose land acreage was known before and after migration had losses of 0.5 to 52 acres after relocating. Seven (11.3%) households had no changes in the sizes of their land holding before and after moving, while 19 households (30.6%) gained land, ranging from 0.5-11.5 acres, after moving.

The loss of land by moving was positively related to the amount of land owned before migration. The average losses ranged from 50% of the pre-migration land holding for households with up to 3 acres, 59% for those with 3-6 acres, and to 66% for households with more than 6 acres. The gain in land was inversely related to the size of holding before moving. The average gain in land holding was most pronounced (630%) among households that had less than 3 acres and by 55% among households that had 3-6 acres of land before moving. Among migrant households, the changes in the amount of land holdings were unrelated to the distances moved by households or to the main reasons for moving. Households that moved for more and/or better land did not fare better than households that migrated because of social reasons, or both resource-social reasons. Neither did the average landholdings of migrants who moved locally differ significantly from those who were long-distance movers.

The changes in land ownership associated with migration in Serengeti district contrasted with the effects of migration, as reported from elsewhere in Tanzania, because

of 'villagization'. Collier et al. (1986) surveyed 20 villages in the Tanga, Dodoma, Arusha, Kagera, Morogoro, Coast/Pwani, Iringa and Mbeya regions in 1980 and found no major change in land concentration after 'villagization'. Their study indicated that the land re-allocation by Village Councils had only a slight equalizing effect in land ownership: 60% of the households remained within the same land ownership size class and another 20% changed to the neighbouring size class but overall 58% households with less than an acre and 70% households with more than 12 acres before settlement consolidation still had the same after 'villagization'. Thus, households with larger land holdings prior to 'villagization' also received the largest although not proportionately equal allocations of land during 'villagization'.

In contrast, the variation in land ownership of migrant households in the Serengeti district decreased significantly and the Village Councils seemed to have had a more equalizing effect on land ownership among in-migrant households. The overall pattern of land ownership among non-migrant, and migrant households before and after moving, differed considerably. Less than a quarter (23.4%) of the non-migrant households had total land holdings of 3 acres or less, and about another third (34%) had holdings above 6 acres in size. Among households after moving, more than a half (52.2%) had total holdings up to 3 acres in size and about a fifth (19.5%) had holdings greater than 6 acres. Prior to their move, a third of the migrant households (33.3%) had land holdings up to 3 acres in size and about another fifth (22.7%) had land holdings above 6 acres in size. In Serengeti district, non-migrant households had an average of 6.6 acres, migrant households had about 4.1 acres after moving and about 5.9 acres before moving. Collier et al. (1986) found that 39.4% of the households in their Tanzanian survey had total land holdings up to 3 acres, and another 23.1% households had land holdings greater than 6 acres. Thus, a much larger proportion of migrant households of Serengeti district owned less land as compared to households that had not moved in the district, and those in other parts of the country.

More significantly, Collier et al. (1986) found that the average size of land holding for a household decreased from 5.2 acres before 'villagization' to 4.7 acres after the settlement consolidation. Their study recognized but could not determine whether the

reduction in average land holding was caused by land scarcity consequent upon the creation of 'villages' and/or because households were allocating less labour to their own plots of cultivation and more to communal activities in the village (e.g. ujamaa farm, building and maintaining schools, clinics, etc.). Neither did the study directly examine the differences in land ownership between those who relocated and those who did not move during 'villagization'. Wagara (1975) concluded that the main effect of 'villagization' in Tarime district was to ensure land for all families but not change the general pattern of settlement as evolved in the colonial period.

Studies by Friis-Hansen (1987) in Njombe and Makete districts of Iringa region (southern Tanzania) showed variable effects of 'villagization' on those who moved during the consolidation of settlements. There was a reduction in the mean area cultivated by a household in Maliwa village because of a shortage of suitable land within an acceptable walking distance and land fragmentation due to inheritance practices rather than land redistribution arising from 'villagization'. In addition, households were inhibited from expanding their cultivation by the highland/valley setting of their village.

In Nagamanga village, households that moved during 'villagization' and which did not own cattle/oxen cultivated less than the others in the village. In Mamongolo village, households that moved during settlement consolidation cultivated less land than those that did not move because of an increase in the distance to their plots and because of land shortage. But land shortages and unfavourable proximity to fields led to intensification in plots with favourable accessibility in both Nagamanga and Mamongolo villages. The cultivation of crops for sale and better access to markets also contributed to the processes of intensification.

7.2.5 Migration and Changes in the Use of Labour and Technology

Land is considered to be abundant in most of Tanzania and its distribution among households has been expected to be determined primarily by the availability of household labour (Collier et al. 1986). Friis-Hansen (1987) concluded that a greater use of ox-plows, increased cultivation of crops for sale, and efforts to compensate for decreased

yields, for example by clearing unused village land, had an effect of increasing the area cultivated per household. Diminished access to land because of shortage and poor proximity to fields, and labour constraints had the effect of reducing the area cultivated per household. Further, households that moved during 'villagization' had less access to land than those that had not relocated. Mascarenhas (1986) found that 'villagization' had greatly increased population pressures in the villages of Rukwa region which in turn resulted in a decline of traditional agricultural practices like fallowing and crop rotation but, also led to the adoption of new technologies and increased sales of food crops.

Several studies also suggested that gender and power relations also affected the relative access of households to rural resources. Tobisson (1986) concluded that the burden of improvements in agriculture in the highlands of Tarime district had fallen more on women than men; in Bukoba district women worked longer on agricultural activities than men (Rald and Rald 1975); yet women in Tanzania generally had less access to land and other resources (Ngalula 1977, Mascarenhas and Mbilinyi 1983, Mascarenhas 1987). Furthermore, those who had acquired positions of leadership and power within villages (usually men) had relatively greater access to land (von Freyhold 1979, Putterman 1981, Coulson 1982).

But how the sizes of land holdings or cultivated area were related to the household sizes and structure, and are associated with the effects of 'villagization', gender, age, education and power relations have remained rather unclear. Collier et al. (1986:51) noted that land concentration among rural Tanzanian households was mainly "accounted for by differences in household size". The size of the household, as mediated through household fertility, had also been found to be associated with land ownership and the size of the cultivated area (Schutjer and Stokes 1985) although the net effects (causal and direction) of land ownership and size of cropped land on household fertility and household size could not be determined *a priori* (Bilsborrow and Winegarden 1985). In addition, the pressure of population on resources in a village was differentially, not equally, felt by households in the village depending on variations in household demography, resource endowments and use.

The size of the household, especially the quantity and quality of its labour force, and

the use of mechanization formed critical aspects of the resource endowment, and their use and productivity in agriculture (Binns 1992). According to Collier et al. (1986:40) "Labour is the main resource of poor people and of poor economies. Its allocation is therefore of central importance to both the level and the distribution of income". The size of the household was also the main determinant of its total basic needs.

The variation in household sizes and the average sizes of households (Table 7.13) did not differ significantly between households that had not moved, and migrant households before and after moving (Bartlett's $\chi^2=2.537$, $df=2$, $p=0.281$; $F=0.642$, $df=2$, 246; $p=0.527$). Thus, hypothesis 13 could be accepted. The average household size in the Serengeti district (6.6-7.3 persons) was larger than the mean size of 5.3 persons observed by Collier et al. (1986) in their other Tanzanian study areas. A larger proportion of the Serengeti households (17.1-22.4%) had more than 9 persons in the household as compared to 9.1% noted by Collier et al. (1986:30).

Table 7.13 Household Sizes Among Non-Migrant and Migrant Households: Serengeti District

Persons	Non-Migrant		Migrant			
			After		Before	
	N	%	N	%	N	%
1-3	10	10.3	14	18.4	14	18.4
4-6	34	35.1	31	40.8	33	43.4
7-9	36	37.1	14	18.4	16	21.1
10-12	10	10.3	10	13.2	7	9.2
13>	7	7.2	7	9.2	6	7.9
Total	97	100.0	76	100.0	76	100.0
Mean Size	7.3		6.9		6.6	
Std.Dev. (persons)	3.83		4.55		4.10	
%CV	52.5		65.9		62.1	

Source: Household Survey, 1991.

Household structure affects and is affected by social processes: Schonmeier (1977) observed that family lineage dominated both social life and communication patterns among the Shambaa in the Usambara Mountains while Gupta and Mwambe (1976) found

that in Tanga district, family size and stability of marriage significantly affected child nutrition but education and income did not. The structure of households in Serengeti district was considered from two main perspectives: (i) the marriage status, and (ii) family structure (Table 7.14). Only the data for non-migrant and migrant households after relocation are tabulated.

The majority of the households were headed by married persons, mainly in monogamous marriages. Households headed by widows and widowers and persons whose marriage or household had been dissolved formed about 16% of the total households. The percentage of widowed/widower and divorced/separated households was almost twice as large among the migrant as among non-migrant households since deaths and marital separation were an important cause of migration.

Table 7.14 Marriage and Family Structure of Households: Serengeti District

	Non-migrant		Migrant		Total	
	N	%	N	%	N	%
Marriage Status						
Unknown	1	1.0	0	0.0	1	0.6
Single	1	1.0	1	1.3	2	1.2
Monogamous	61	62.9	42	55.3	103	59.5
Polygamous	24	24.7	17	22.4	41	23.7
Widowed/widower	7	7.2	12	15.8	19	11.0
Divorced/separated	3	3.1	4	5.3	7	4.0
Total	97	99.9	76	100.1	173	100.0
Family Structure						
Nuclear	49	50.5	35	46.1	84	48.5
Extended-lineal	26	26.8	26	34.2	52	30.1
Extended-other	22	22.7	15	19.7	37	21.4
Total	97	100.0	76	100.0	173	100.0

Note: Percentage totals affected by rounding error
Source: Household Survey, 1991.

Household structure was mainly of two family types: slightly less than half were nuclear families comprising of parents (including polygynous unions) and their children (if any); and, the rest were households with extended family comprising of parent-parents with their lineal descendents (e.g. children and grand children), or households with

extended family of other types (e.g. parent/parents with lineal descendants and other relatives, kin, etc.,). There were no significant differences between non-migrant and migrant households (after moving) in their proportions of the types of family structures (Likelihood Ratio $\chi^2=1.121$, $df=2$, $p=0.571$).

In a household, not all its members were a source of labour for the household's agricultural and economic activities even if three year old children imitated and helped their parents and older siblings in weeding a plot or drove goats into the livestock pen. The intra-household labour force was envisaged mainly to consist of adults aged 15 years and above, and who were identified as active participants in the household agricultural activities. Thus, an elderly person aged 65 identified during the household survey as a farmer (mkulima) was included in the group of adults but a 65 year old identified as retired, and disabled persons were excluded. In contrast, Collier et al. (1986:40) adopted, arbitrarily as they noted, a minimum age of 12 years to include persons in defining the labour force.

The average numbers of adults in the non-migrant and migrant (after relocating) groups of households (Table 7.15) were not significantly different ($p=0.443$) but the variation in the number of adults who were agriculturally active among households of the two groups was significantly different ($p=0.05$). The relative variation among households in the number of agriculturally active adults was the largest in migrant households after moving and the least among non-migrant households.

The difference in the percentage of adults in the migrant households before and after moving were due to three main factors: (i) an in-migrant household may have been a part of a larger household that sub-divided and some relocated; (ii) some members of an in-migrant household attained adulthood between the period of relocation and the survey; and, (iii) there may have been additions to the in-migrant household of adults through marriage or a loss of agriculturally active adults because of death, out-migration or retirement since relocation.

Table 7.15 Number (N) and Percentages (%) of Agriculturally Active Adults in Households: Serengeti District

No. of Adults	Household Non-Migrant		Groups Migrant			
			After Moving		Before Moving	
	N	%	N	%	N	%
1	2	2.1	9	11.8	6	7.9
2	21	21.6	18	23.7	28	36.8
3	24	24.7	18	18.6	16	16.5
4	18	18.6	12	15.8	10	13.2
5	20	20.6	8	10.5	9	11.8
6>	12	12.4	11	14.5	7	9.2
Total	97	100.0	76	100.0	76	100.0
Mean	3.8		3.6		3.2	
Std.Dev.	1.74		2.25		1.68	
%CV	45.2		62.3		52.3	

Source: Household Survey, 1991.

Households in Serengeti district did not exclusively depend on their own labour force to carry out various agricultural tasks. Extra-household labour was also used and included assistance from other immediate family members (e.g. brother) and relatives (e.g. in-laws) in separate households, communal working parties (msaragambo), and paid workers (Table 7.16). The percentages are based only on those households with known use of the different sources of labour.

Non-migrant and migrant households, before and after moving, did not differ in their use of labour provided by extra-household members of family and other relatives although a larger proportion of migrant households had help from other family members and relatives, before and after moving, as compared to non-migrant households. The differences in proportions were not significant. The proportions of migrant households that used both msaragambo and paid workers as sources of extra-household labour, before and after moving, did not differ. But, a larger percentage of non-migrant households used msaragambo and paid workers as sources of extra-household labour as compared to migrant households in their places of origin and destination.

Table 7.16 Sources and Use of Extra-Household Labour: Serengeti District

Household Group	Non-migrant		Migrant			
			After Moving		Before Moving	
Use Labour	N	%	N	%	N	%
a) Family/relatives:						
Unknown	1		12		8	
No	59	61.5	36	56.3	41	60.3
Yes	37	38.5	28	43.7	27	39.7
b) Communal Working Party (Msaragambo):						
Unknown	1		14		8	
No	32	33.3	33	53.2	32	47.1
Yes	64	66.7	29	46.8	36	52.9
c) Paid Workers:						
Unknown	1		12		7	
No	72	75.0	57	89.1	60	87.0
Yes	24	25.0	7	10.9	9	13.0

Source: Household Survey, 1991.

It could not be ascertained whether the above differences in the use of extra-household labour were related to differences in attitudes of migrant and non-migrant households towards the use of labour from others than relatives, to differences in income and wealth to pay workers or for food and drink to msaragambo, and/or to a failure of migrants to develop more extensive social networks in their wider village communities as a source of assistance. More likely, recent in-migrants had as yet to develop as extensive a range of social contacts within the village when compared to the other residents of the village.

Technology forms an additional important component of any agroecological system (Boserup 1965). In Tanzania, the most widely used tool in farming is the hoe but ox-ploughing has been an important innovation in the evolution and intensification of non-estate agriculture (Kajerby 1983, Pingali et al. 1985). All the households surveyed used a hoe for cultivating, often augmented with a panga (machete) for clearing bush and tree branches where needed. None of the non-migrant households used a tractor for ploughing and only two of the seventy six migrant households had done so before moving.

The number and percentage of households, non-migrant and migrant (before and after moving), that used ox-ploughing in the Serengeti district are shown in Table 7.17. The percentages are based only on households whose use of ploughing techniques was known. The rest of the migrant households had not begun cultivation at the time of the survey, were not or had not been farmers before, or were unable to recollect clearly their previous agricultural activities. The few households that had used tractors were included in the group that used ox-ploughing.

Table 7.17 Use of Ox-ploughing By Households: Serengeti District

Use Ox-ploughing	Household		Groups			
	Non-migrant		Migrant		Before Moving	
	N	%	After Moving	%	N	%
Unknown	1		10		9	
No	30	31.3	31	47.0	29	43.3
Yes	66	68.7	35	53.0	38	56.7
Total	97	100.0	76	100.0	76	100.0

Source: Household Survey, 1991.

The proportions of migrant households that used ox-ploughing before and after moving did not differ (Likelihood Ratio $\chi^2=0.182$, $df=1$, $p=0.669$); nor did non-migrant households significantly differ in their use of ox-ploughing from migrant households before their relocation. However, a significantly greater percentage of non-migrant households used ox-ploughing as compared to migrant households after relocation (Likelihood Ratio $\chi^2=4.099$, $df=1$, $p=0.043$).

The use of ox-ploughing was not entirely confined to households that owned oxen and ox-ploughs. Households borrowed or rented oxen and ploughs, or assisted owners of oxen and ploughs in ploughing their fields in exchange for the use of oxen and ploughs. The differences in the use of ox-ploughing by households could not be explained by the differences in the ownership of oxen among the non-migrant and migrant households, before and after moving. The group of non-migrant households owned an

average of 1.4 oxen, and migrant households owned 0.7 oxen after moving and 1.5 oxen before moving. But these differences were not significant ($F=2.310$, $df=2$, 236; $p=0.101$).

The ownership of livestock may be a source of wealth that allows households to purchase or rent oxen and ox-ploughs. There were no significant differences in the average ownership of cattle, shoats (sheep and goats), or livestock units (cattle + shoats, one head of cattle=5 shoats) by non-migrant and migrant households before and after moving (results not tabulated). The variation in ownership of different types and total livestock units among the three groups of households was significant. Thus, hypothesis 15 could be accepted.

While livestock ownership may have been under-reported during the household survey, some trends in ownership were clear. First, the banditry and rustling of livestock in Serengeti and nearby districts reduced oxen and overall livestock ownership among both migrant and non-migrant households: 6 households had most, if not all, of their livestock rustled. Secondly, some households migrated to protect their livestock while others dispersed their herds among relatives and friends. Finally, diseases also took their toll: 3 households reported deaths of livestock from various diseases such as East Coast Fever, anthrax, foot and mouth, and due to a lack of adequate grazing. The insecurity in the district hindered the delivery of veterinary services which were also meager because of the costs and scarcity of veterinary medicines. A villager observed that cattle dips had only the smell rather than potency of medicine to protect their cattle from ticks.

7.2.6 The Relationship Between Land Ownership and Use, Migration, Household Demography, and Agroecology

The variations and changes in the major factors (land, labour and technology) of the household agroecological system and as associated with migration have been outlined in the preceeding sections. How the various features of household demography, land, labour, technology, socio-economy and location operated both individually and jointly in the complex system of the household agroecology needed to be examined. Such an analysis would also account for the effects of multi-collinearities, if any, between the

individual variables.

In Serengeti district, the acreage cultivated by a household was postulated to depend on the size of the household as its main source of labour, the ecological features of the land (catenary diversity of plot locations, agroecological zone, plot fertility), the locational characteristics of the land (distances to plots, proximity to national park boundary), the uses of mechanization (ox-ploughing) and extra-household labour (msaragambo), the cultivation of cotton as a cash crop, the status of the household (whether the household had a member in a position of leadership in the village, sex of the head of household), and whether the household had moved during 'villagization'.

Households that were larger and thus with greater labour resources, desired a greater variety of land types on the catena, were willing to walk farther to their plots, used ox-ploughing and extra-household labour, and grew cash crops were expected to have and cultivate relatively larger land holdings. Households with positions of leadership in the village structures, which were headed by males, and were resident in the village before 'villagization' were also expected to be relatively favoured in their access to land. Finally, households in the hills/highland area were expected to cultivate relatively more land because of better rainfall and more developed catenas in the zone. Thus, all their effects on the sizes of land holdings and cultivated area were expected to be positive. A closer proximity to the Serengeti National Park was expected to constrain access to and use of land since the park boundary was a barrier to settlement development and because of the impact of wildlife. Its effect on the area of land holding and cultivation was expected to be negative.

The acreage cultivated by households, as the dependent variable, was regressed against the household size (HHsize), the diversity of plot locations on the catena (Pdiverst), the walking time (minutes) to the farthest plots (Fardist), the agroecological zone inhabited (Agrozone; upland plateau=1, hilly/highland=2), the distance to the national park boundary (1=boundary villages, 2=villages upto 10 km, 3=villages upto 20 km, 4=villages upto 30 km), whether the households used ox-ploughing (Ox-plough; yes=1, no=0) or owned oxen (number), whether the household used extra-household labour (Msaragambo; yes=1, no=0), whether the households grew a cash crop, e.g.

cotton (Cashcrop; yes=1, no=0), the sex of the head of the household (Sex; male=1, female=2), if any household member was in a position of leadership (Leader; yes=1, no=0), and whether the household had not moved during 'villagization' (NoSogeza; yes=1, no=0).

Multiple regression models (Table 7.18) were derived for each of the three groups of households: non-migrants; migrants after relocation; and, migrants before relocation. The acreage of the cropped land and the walking time (minutes) to the farthest plots were transformed using the natural log (i.e. Ln Land, Ln Fardist).

Table 7.18 Land Use, Household Demography and Agroecology: Serengeti District

Non-migrants (N=93, adj.R²=0.280, S.E.Estimate=0.589)

Variable	Coeff.	Std. Error	Std. Coeff.	T	p(2 tail)
Constant	0.789	0.152	0.000	5.183	<0.001
HHsize	0.044	0.017	0.248	2.674	0.009
Pdiverst	0.253	0.056	0.416	4.483	<0.001

F=18.931, df=2, 90, p<0.001

Migrants After Relocating (N=56, adj.R²=0.428, S.E.Estimate=0.741)

Variable	Coeff.	Std. Error	Std. Coeff.	T	p(2 tail)
Constant	-0.568	0.255	0.000	-2.224	0.031
HHsize	0.096	0.023	0.444	4.222	<0.001
LnFardist	0.183	0.075	0.262	2.442	0.018
Pdiverst	0.315	0.111	0.297	2.845	0.006

F=14.728, df=3, 52, p<0.001

Migrants Before Relocating (N=61, adj.R²=0.344, S.E.Estimate=0.751)

Variable	Coeff.	Std. Error	Std. Coeff.	T	p(2 tail)
Constant	0.563	0.208	0.000	2.705	0.009
HHsize	0.042	0.025	0.178	1.679	0.099
Cashcrop	0.803	0.210	0.419	3.818	<0.001
Oxen	0.163	0.034	0.536	4.831	<0.001

F=11.507, df=3, 57, p<0.001

The results suggested that the relationship between the acreage of land cultivated and its determinants was non-linear. Instead, a better fit regression model was derived using

the natural log values of the dependent variable (area cultivated). The area of land cultivated by a household was positively related to the household size among all the three groups of households. The diversity of catena habitats for cultivated plots significantly influenced the variation in the acreage cultivated by non-migrant, and migrant households after their relocation but had no influence on the variation in the acreage cultivated by households before their migration. The farthest distance to the plots owned by households had a significant influence only on the amount of land cultivated by migrant households after their relocation. In contrast, the cultivation of cotton as a cash crop and the number of oxen owned by a household had a significant influence only on the variation in area cultivated by migrant households before they moved.

The range of habitats available to households for growing crops on the local catena had almost twice greater effect than the household size in influencing the amount of area cultivated by non-migrant households. Ecological diversity was a key factor of the agroecology of non-migrant households. Among migrant households that had relocated, the greater influence was that of the household size and then almost equally, that of ecological diversity of plot locations and the farthest distance to cultivated plots.

Ecological and locational factors had no significant influence on the amounts of land cultivated by households before their migration; instead, the ownership of oxen and the cultivation of cash crops were the dominant influences in addition to household demography. Migrant households did not differ in their use of ox-ploughing before and after moving. The importance of oxen ownership as a factor affecting the area cultivated by households prior to migration could not be attributed to the relative differences in oxen ownership or to differences in the use of ox-ploughing between the three groups of households. But owners of oxen were at a relative advantage since they could use them for farm work whenever they wished while those who used oxen belonging to others had to wait until oxen become available (Friis-Hansen 1987).

The total household size explained slightly more of the variation (about 2%) in area of land cultivated than the number of adults (aged > 14 years) as the main source of household labour. The children thus made a significant, additional contribution to the total household labour and the variation in area cultivated, but the use of extra-household

labour (msaragambo, paid workers) did not. The variation in the amount of land cultivated by households was also not affected by the agroecological zone inhabited by the households or its proximity to the Serengeti National Park. Neither the sex of the head of the household nor a position of leadership affected relative access to land and its cultivation by households.

Since non-migrant and in-migrant households lived in the same village communities, their inter-relationship between the land area cropped, household demography, and status as non-migrant or in-migrant could be modelled as follows (Table 7.19). The natural log transformed values of land holdings for households were regressed with the household sizes (HHsize), the migration status of the household (Non/Mig; Migrant=1, Non-Migrant=0), the number of land types on the catena (Pdiverst), and the natural log values of the distance to the farthest plots owned by households (Ln Fardist).

Table 7.19 Land Use, Household Demography, and Agroecology: Non-Migrant and In-migrant Households, Serengeti District

Non-Migrants and Migrants After Relocating (N=147, adj.R²=0.434, S.E.Estimate=0.663)

Variable	Coeff.	Std. Error	Std. Coeff.	T	p(2 tail)
Constant	0.329	0.164	0.000	2.005	0.047
HHsize	0.073	0.014	0.344	5.396	<0.001
Non/Mig	-0.487	0.116	-0.269	-4.192	<0.001
Pdiverst	0.231	0.055	0.284	4.199	<0.001
LnFardist	0.120	0.043	0.184	2.774	0.006

F=28.962, df=4, 142; p<0.001

While the model is useful for summarizing and depicting the role of migration in the agroecology of Serengeti households, the models shown in Table 7.18 are more appropriate and useful analytically.

Household size had the dominant influence on the acreage cultivated by non-migrant households and the migrant households that had relocated. The diversity of catena locations available to households for agricultural activities and the distance to the plots farthest from homestead sites also positively affected the acreage cultivated. Thus, a

household could acquire and cultivate a relatively larger area by accepting a larger diversity of catena locations and by walking farther distances to plots for cultivation. But more effort was required in cultivating plots at greater distances and in the lower parts of the catena, especially the heavy clays of the mbuga. In-migrants were relatively disadvantaged in their relative access to and the total area cultivated as mediated through the effects of household size, and the ecological diversity and the distance to the farthest cultivated plots.

On the other hand, 96 non-migrant and 65 migrant households after relocation did not differ in their ratings of the fertility of the plots they cultivated ($p=1.0$). They rated the fertility of their plots as equal (means=3.5). Plot fertility was rated by respondents on a scale of 1 to 5 (very poor to very good) and the average was computed by dividing the sum of fertility ratings by the total number of plots. But the non-migrant households rated the fertility of their plots (mean=3.5) higher than the fertility of plots rated by 67 migrant households before moving (mean=3.1). This difference was significant ($p=0.009$). Migrant households rated the fertility of plots they cultivated (mean=3.5) higher after moving as compared to before moving (mean=3.1). This difference was also significant ($p=0.02$). Thus, sub-hypothesis (iv) of hypothesis 12 could be accepted as applied to the difference in the average ratings of plot fertilities by non-migrant and migrant households after relocation. But the sub-hypothesis could be rejected as applied to the difference in the average fertility ratings of plots cultivated by non-migrant households and migrant households before moving, and by migrant households before and after moving.

The close relationship between changes in the number of land types or catena habitats cultivated and the number of crops grown by households was noted earlier. The number of crops grown were expected to be positively influenced by the amount of land and the types of habitats on the catena or ecological range available for farming. The proximity of cultivated plots was also expected to affect the number of crops grown; more crops could be grown if plots were located closer to the homestead site. The use of mechanization (ox-ploughing) was expected to mediate its influence on the number of crops grown through the total area of land cultivated; more land was expected to be

ploughed, and faster, using oxen and cultivated than if the household used only hoes. A relative reduction in ploughing time would leave more time to grow more crops within the seasonal confines of the agricultural calendar. Similarly, the number of plots cultivated was expected to influence the number of crops grown as mediated through the variation in the different types of land cultivated on the catena, the average fertility of the plots, as well as the practise of the household to devote different plots to different crops. Less fertile plots were expected to be more likely put under a single crop (e.g. cassava) while more fertile plots were expected to support a larger number of crops.

The relationship between the number of crops grown (Numcrops) as regressed against size of land holding (Ln Land), the total number of plots (Totplots), their average proximity (Ln Avdist), the number of land or habitat types (Pdiverst), and the use of mechanization (Oxploughing; yes=1, no=0) among non-migrant and migrant households after relocation could be modelled as in Table 7.20. The results indicated that the number of crops grown by households was positively influenced by the total amount of land cultivated, the range of habitats on the catena used for plots, and the use of mechanization. The number of crops cultivated declined as the average distance to plots (minutes walking time) increased.

Table 7.20 The Relationship Between Number of Crops Grown, Land and Mechanization: Non-migrant and In-migrant Households, Serengeti District

Non-Migrants and Migrants After Relocating (N=146, adj.R²=0.314, S.E.Estimate=1.558)

Variable	Coeff.	Std. Error	Std. Coeff.	T	p(2 tail)
Constant	1.898	0.343	0.000	5.535	<0.001
Ln Land	0.784	0.184	0.362	4.261	<0.001
Totplots	0.210	0.103	0.166	2.045	0.043
Pdiverst	0.334	0.144	0.193	2.326	0.021
LnAvdist	-0.314	0.110	-0.211	-2.857	0.005
Oxploughing	0.469	0.282	0.120	1.665	0.098

F=14.252, df=5, 140; p<0.001

The acreage cultivated had almost twice the effects of ecological diversity and the total number of plots, and three times the effect of mechanization on the number of crops produced. The migration status of a household (in-migrant as opposed to a non-migrant) did not affect the number of crops grown. Neither did the number of crops grown vary with the average fertility of plots. But the number of crops grown was positively associated with the number of plots cultivated.

The number of plots (Totplots) cultivated by households was significantly influenced by the number of adults in the household (NumAdult), the distance to the farthest plots (Ln Fardist), and the average fertility of the plots being cultivated (Table 7.21).

Table 7.21 Total Number of Plots Cultivated, Number of Adults, Plot Proximity and Fertility: Non-migrant and In-migrant Households, Serengeti District

Non-Migrants and Migrants After Relocating (N=148, adj.R²=0.195, S.E.Estimate=1.335)

Variable	Coeff.	Std. Error	Std. Coeff.	T	p(2 tail)
Constant	-0.571	0.563	0.000	-1.016	0.312
NumAdult	0.179	0.058	0.230	3.090	0.002
LnFardist	0.303	0.082	0.274	3.685	<0.001
Avfert	0.464	0.140	0.245	3.307	0.001

F=12.882, df=3, 144; p<0.001

Each adult was perhaps being responsible for a plot or some plots and sometimes polygamous households divided their plots among the wives for agricultural activities.

7.2.7 Migration and Life Situations and Conditions of Migrants

The preceding analysis examined the changes in the ecological characteristics, proximity, ownership and use of land associated with migration, and compared and modelled the agroecological systems of households of non-migrants and migrants, before and after moving. This following section considers the subjective changes, as evaluated through the attitudes and perceptions of the migrants, in their conditions and access to

resources, social services and economic factors, and in their overall life situations, environment and conditions.

The seventy six migrant households were asked to comparatively rate their life situations and conditions on a number of specific and general factors before and after moving. A five point scale was adopted (much worse, worse, same, better, much better) to rate various resource, socio-economic, environmental and overall life conditions (Table 7.22). The table shows the number of households unable to provide a rating, and the percentage of households in each rating category for each factor for households that provided a comparative rating on each factor. Most of the migrants unable to comparatively evaluate their life situations and conditions observed that they had not been resident in their villages of destination long enough. Others could not do so because they did not keep livestock, did not have school children, etc.

A majority of migrants were unable to rate the conditions in neighbouring villages, town and in the rest of the district and region because of the limited information or experience about places other than their immediate locality and places of residence. A majority of migrant households rated themselves better or much better off after moving in terms of their land resources: 72.3% were better off in terms of land for cultivation and 64.7% evaluated themselves as better off in the fertility of their soils. These evaluations however contrasted some of the trends in the objective changes in land characteristics noted earlier (section 7.2.4). About 58% of migrant households had a decrease in the size of their land holdings, 11.3% had the same acreage, and 30.6% had an increase in their holdings after moving. The changes in diversity of catena locations available to households for cropping indicated a loss for 19.7% of the migrant households, a gain for 22.4%, and no changes for 31.6% of the households that moved.

More households rated themselves better off in their rainfall, health, environmental, leadership and security conditions and in the availability of pastures, wood, water, school, markets, shops and goods, farm inputs and extension services after moving. While the costs of medicine improved for some migrant households overall, the availability of clinic services and transport worsened rather than improved for relatively many more households. More households also rated a worsening in the costs of inputs,

farm tools, and transportation as well as in the prices of crops by moving.

Table 7.22 Comparative Ratings of Life Situations and Conditions in Villages of Origin and Destination: Serengeti Migrants

Factor	Don't Know	Much Worse	Worse	Same	Better	Much Better
Land	11	6.2	6.2	15.4	41.5	30.8
Soils	8	7.4	4.4	23.5	39.7	25.0
Rainfall	9	3.0	6.0	64.2	16.4	10.4
Environment	16	1.7	5.0	41.7	33.3	18.3
Stock health	31	8.9	2.2	46.7	26.7	15.6
Pastures	11	6.2	16.9	33.8	29.2	13.8
Wood	6	11.4	7.1	41.4	30.0	10.0
School	8	4.4	7.4	54.4	16.2	17.6
Water	6	10.0	21.4	30.0	31.4	7.1
Markets	11	4.6	6.2	72.3	13.8	3.1
Auction	10	4.5	7.6	75.8	10.6	1.5
Shops/goods	8	11.8	11.8	48.5	26.5	1.5
Extension	16	1.7	13.3	65.0	16.7	3.3
Health	8	0.0	10.3	42.6	33.8	13.2
Clinic	8	11.8	16.2	45.6	10.3	16.2
Medicine cost	20	1.8	3.6	87.5	7.1	0.0
Farm inputs	12	3.1	9.4	70.3	14.1	3.1
Input prices	16	0.0	8.3	85.0	6.7	0.0
Tools	12	7.8	6.3	70.3	14.1	1.6
Tool prices	18	1.7	8.6	81.0	8.6	0.0
Transport	8	11.8	23.6	48.5	14.7	1.5
Transp. costs	17	3.4	15.3	71.2	10.2	0.0
Crop prices	17	3.4	10.2	74.6	6.8	0.0
Goods prices	14	0.0	11.3	77.4	11.3	0.0
Leadership	10	0.0	0.0	66.7	22.7	10.6
Security	8	1.5	5.9	41.2	36.8	14.7
Previous Village	8	2.9	48.5	23.5	20.6	4.4
Present Village	8	0.0	5.9	22.1	47.1	25.0
Neighbouring Village	40	0.0	16.7	52.8	22.2	8.3
Neighbouring Town	42	0.0	11.8	26.5	32.4	29.4
District's Villages	64	0.0	8.3	58.3	33.3	0.0
Region's Villages	69	0.0	14.3	42.9	42.9	0.0

Note: Percentages across rows total 99.9 or 100.1 due to rounding error, Number of don't know out of 76 households

Source: Household Survey, 1991.

Almost twice as many households rated the life situations and conditions worse in their villages of origin as compared to those who evaluated them as the same or worse in their present village of domicile. Overall, around 72% of the migrant households rated themselves better or much better off in their current village of residence while only about 6% rated themselves worse off. Hypothesis 24 could be rejected. The ability of households to evaluate the situations and conditions in places outside of their own life experience, for example the neighbouring village or town and other villages in the district and region, decreased considerably. About 50-55% of the households were unable to compare their life situations and conditions with those in the neighbouring village and town, and over 80% were unable to do so with villages in the rest of the district and region.

Among households that did provide comparative ratings, about half rated the life situation and conditions the same and more thought it better or much better than worse in the neighbouring village as compared to their own village. About twice as many households rated the conditions in the neighbouring town better than in their own village, about a fifth considered them similar and about 12% evaluated the situation and conditions in the town worse off than in their village. Nearly half of the households thought the quality of life and the living conditions in the rest of the villages in the district and region was similar as that in their own village while more thought it better than worse.

Overall, more households rated slight or considerable improvements in their access to resources, social services other than clinics and transportation, leadership, and security after moving. But more households experienced a worsening in the availability and costs of the factors of agricultural production, transportation and health services. While the majority of migrants rated their life situations and conditions better in their present villages of domicile as compared to their villages of origin, more households thought the situation and conditions of life were better, if not the same in the neighbouring village, town, and in the rest of the district and region. At the household-level, migration had resulted in improvements in several aspects of the life situations and conditions, both objective and subjective, of migrant households. Migration was apparently a successful

strategy for most households in gaining access to the quality and amount of resources they desired, at least as subjectively evaluated, by the migrants themselves. The following section examines the community level impacts and consequences of migration.

7.3 Migration, Development and Social Equity

An understanding of the linkages between household demography, migration, and household agroecology, as examined in the preceding sections, forms one significant aspect of the framework for shaping agricultural and rural development policy in the Serengeti district. Another important issue of rural policy, in addition to improving life and promoting economic growth, is that of achieving social equity as a foundation of Tanzanian development goals and strategies (Arusha Declaration, 1967).

Some specific questions considered by the present study were: How was equity related to migration and as mediated through the effects of individual and household characteristics (gender, ethnicity, age, education, marital status, family structure), household-community interactions (positions of leadership and power, the use of technology and extra-household labour among households), and village demography-resource situations? Thus, were women, ethnic minorities, the aged, the less educated, those who were unmarried, widowed or divorced, those not in positions of power and with poor or no access to agricultural technology and extra-household labour relatively deprived in their access to and use of land and did being a recent in-migrant exacerbate such deprivation, accentuate inequity and promote differentiation in rural communities?

At the meso and macro levels of household and community interactions the questions included: Was equity in access to land and its use related to the population growth and net migration trends of villages? Hence, did villages with high rates of in-migration have relatively less land per capita to allocate to in-migrants and less equitable ownership and use of land or was equity better and average acreage of land per capita higher among households (non-migrant and migrant) in villages with net out-migration?

7.3.1 The Equity of Land Holding and Cultivation per Capita

Since household size was a major determinant of the size of the land owned or cropped by households, the land owned (Landpc) or cultivated per capita (Cultpc) was envisaged as a more effective criterion of equity and accessibility of households to land in villages. The values of land owned or cultivated per capita were computed by dividing the total size of holding or cultivation by the household size, that is the number of persons in the household. The values of household size for households before moving were derived as at the time of relocation and for households after moving as at the time of the survey in 1991. The total number and percentages of households in each acreage per capita class were derived only with the data for households with known acreage per capita. Households did not differ significantly in the amounts of land owned and cultivated per capita. For example, non-migrant households owned and cultivated on the average an acre per capita, migrant households after relocation owned on the average 0.75 acres and cultivated 0.69 acres per capita, and migrant households before moving owned and cultivated an average 1.18 acres per capita. Thus, hypothesis 18 is accepted since almost all the land owned by households is/was cultivated. Consequently, the following analysis will focus on the land cultivated per capita.

The number of households with unknown land cultivated per capita values differed between the three groups: among non-migrants, 3 out of 97 households (3.1%); among migrant households after relocation, 9 out of 76 households (11.8%) because most had not yet obtained cropland or begun cultivation; and, among migrant households after moving, 10 out of 76 households (13.1%) mainly because of a failure to remember or estimate the area of their previous land holdings. The size distribution of land cultivated per capita by households indicated (Table 7.23) that the majority (75-88%) of households cultivated up to 1.2 acres per capita. The range in land cultivated per capita for households was 0.16-3.57 acres among non-migrants; 0.05-5.0 acres among migrant households after relocation and 0.08-18.33 acres before moving.

Table 7.23 Land Cultivated per Capita (acres) by Households: Serengeti District

Acreage Class	Household Non-Migrant		Group Migrant			
	N	%	After Moving N	After Moving %	Before Moving N	Before Moving %
<0.400	16	17.0	25	37.3	13	19.7
0.401-0.800	30	31.9	22	32.8	22	33.3
0.801-1.200	25	26.6	12	17.9	15	22.7
1.201-1.600	6	6.4	5	7.5	6	9.1
1.601-2.000	10	10.6	1	1.5	5	7.6
>2.000	7	7.4	2	3.0	5	7.6
Total	94	99.9	67	100.0	66	100.0
Mean Acreage	1.0		0.7		1.2	
Std.Dev. (acres)	0.72		0.70		2.26	
%CV	72.0		100.0		188.3	

Source: Household Survey, 1991.

The variation in the land cultivated per capita between the three groups of households was significant (Bartlett's $\chi^2=140.56$, $df=2$, $p<0.001$), especially between migrant households before moving and non-migrant households, and migrant households before and after moving. The differences in the average amounts of land cultivated per capita between the three groups of households were not significant ($F=2.2$, $df=2$, 223; $p=0.110$). Only the absolute difference in the mean amount of land cultivated per capita by the migrant households before and after moving was significant at $p=0.1$. Thus, sub-hypothesis (ii) of hypothesis 12 could be accepted whether applied to the differences in the per capita ownership or cultivation of land by the three groups of households. Non-migrant households had an average of 1 acre/capita, migrant households had about 0.7 acres/capita after moving and, about 1.2 acres/capita before moving as compared to about 0.9 acres/capita observed by Collier et al. (1986) in other areas of Tanzania.

Households did not significantly alter their average amount of land holding or cultivation per capita by moving but there was a great improvement in equity only among migrant households in access to and use of land by migrating. The per capita distribution of land ownership and its use was most equitable among the non-migrant households, and

most inequitable among migrant households before they moved. After relocation, households that moved did not differ in per capita land ownership and cultivation when compared to non-migrant households ($p > 0.1$).

But the concentration among households of land cultivated per capita was unfavourable for in-migrant households when compared to their co-resident, non-migrant households (Likelihood Ratio $X^2 = 14.3$, $df = 3$, $p = 0.002$). A significantly larger proportion of in-migrant households (37.9%) as compared to non-migrant households (15.9%) were among the households with the lowest 25% of land cultivated per capita. The average area per capita cultivated by households in the lowest quartile was about 0.25 acres. The upper 50% of households had 61% of the non-migrant households as compared to 33.4% of in-migrant households and the highest 25% of households had 30.9% of the non-migrant households as compared to 16.7% of the in-migrant households. Thus, hypothesis 17 could be rejected whether applied to equity in the ownership or cultivation of land per capita among non-migrant households and migrant households that had relocated. The average area cultivated per capita by households in the highest quartile was about 1.81 acres. The variation among households in the acreage cultivated per capita was smaller in the lower quartiles of households (Coefficient of variation = 14.8 to 36.9%) as compared to the variation among the upper quartiles of the households (Coefficient of variation = 14.2 to 68.1).

The overall assessments of equity in household access and use of land by non-migrants and migrants based on per capita values did not differ significantly from that based on the per household values (Table 7.24). This lack of significant differences was mainly because the means and variations in household sizes between non-migrant and migrant households, before and after moving, were not significant. But the table shows that some differences, although not statistically significant, arise in the assessment of equity among household groups when per capita or per household level values are used as measures even when the means and variations in household sizes between the populations being compared are not significant. But the differences in the equity of land ownership and cultivation are significant in the context of public policy, especially when egalitarian development is a goal.

Table 7.24 Number (N) and Percentage (%) of Households in Quartile Groups by Per Household and Per Capita Measures of Equity In Land Use: Serengeti District

Household Group	Per Household		Per Capita	
	N	%	N	%
Highest 25%				
Non-migrant	29	30.9	29	30.9
Migrant	12	17.4	11	16.7
Upper 50-75%				
Non-migrant	25	26.6	29	30.9
Migrant	16	23.2	11	16.7
Lower 25-50%				
Non-migrant	27	28.7	21	22.3
Migrant	14	20.3	19	28.8
Lowest 25%				
Non-migrant	13	13.8	15	15.9
Migrant	27	39.1	25	37.9

Source: Household Survey, 1991.

If intra-village and inter-village or other types of assessments and comparisons of equity are to be made in Tanzania, the effects of variations in household size on land concentration need to be considered. Overall, the analysis of land owned and used by the households in Serengeti district showed that the 10% of households with the largest land holdings and use accounted for about 30.8% of the total land and the lowest 10% households had only 2.2% of the total land owned and used. While the amount of land owned and used by households was significantly related to household size, the more significant question of the other underlying causes and mechanisms of rural inequity and their inter-relations with migration are considered in the following section.

7.3.2 The Role of Migration as a Structural Determinant of Rural Differentiation

A two-way analysis of variance was used to assess the separate and combined effects of non-migration and migration (ResMig) on variation in land per capita cultivated as mediated through some structural factors of rural differentiation (Goldscheider 1984). The variation can be taken as a measure of equity; the greater the variation, the lesser

the equity. In this analysis, the structural factors considered were gender, age, education, marital status, family structure, family adult female composition, ethnicity, positions of power or leadership now, access to ox-ploughing (technology), the use of msaragambo for extra-household labour, and the net population growth and migration trends in the villages (Table 7.25).

The ages of the heads of households were assigned to six age cohorts: the cohorts were 25 years and below, 26-35, 36-45, 46-55, 56-65, and above 65 years old. The education levels of the heads of households were categorized into three groups (Educat): those with no schooling, 1-6 years, and 7 or more years of schooling. For those with specialized training, the number of years spent in the training, for example teacher's college, carpentry school, etc., were added to the period of basic schooling.

The marital status of the heads of households was classified as the group of single, widowed/widower, separated or divorced persons; monogamously married; and, polygamously married. The household structure was classified by family type: nuclear; extended-lineal; and extended-other. Family female composition was assessed in terms of the number of adult females (15 years and above) in households since women carry relatively more of the burden of rural livelihood and usually with poorer access to resources. Four classes of family, adult female composition were identified: 0 or 1 female, 2 females, 3 females, and 4 or more females.

The ethnicity of heads of households was categorized into 6 groups based on language spoken, other than KiSwahili: WaKuria, WaIkoma, WaNatta/Issenye, WaSukuma, and Others. Leadership was evaluated on the basis of the membership of a person or persons from the household in a position of leadership in the village. The other household-level variables were the use of ox-ploughing and msaragambo which were used as proxy measures for the level of agricultural technology and the use of extra-household labour respectively.

Finally, the population growth and net migration trends in villages were considered as a factor potentially affecting the distribution of land among households since village governments were mainly responsible for allocating land to most households, especially in-migrant households, and were also implementing policies towards in-migration

depending on their specific resource and population situations (see chapter 6, section 6.6). More specifically, did the type of population trend in a village influence the accessibility to land by migrant households?

Table 7.25 Land Cultivated per Capita, Migration and Equity: Non-migrant and In-migrant Households, Serengeti District

a) Gender (Sex) and Migration (ResMig):

Source Variables	SS	Df	MS	F	p
ResMig	0.905	1	0.905	1.826	0.179
Sex	0.219	1	0.219	0.442	0.507
ResMig*Sex	0.289	1	0.289	0.583	0.446
ERROR	77.310	156	0.496		

b) Age (Cohort) and Migration (ResMig):

Source Variables	SS	Df	MS	F	p
Cohort	6.176	5	1.235	2.621	0.027
ResMig	0.172	1	0.172	0.364	0.547
Cohort*ResMig	4.578	5	0.916	1.943	0.091
ERROR	69.755	148	0.471		

The age cohorts were: up to 25, 26-35, 36-45, 46-55, 56-65, and, over 65 years in age

c) Education (Educat) and Migration (ResMig):

Source Variables	SS	Df	MS	F	p
Educat	0.754	2	0.377	0.765	0.467
ResMig	2.418	1	2.418	4.910	0.028
Educat*ResMig	1.065	2	0.532	1.081	0.342
ERROR	75.833	154	0.492		

The education categories were: no schooling, 1-6 years, 7 and more years

d) Marital Status (Maritstat) and Migration (ResMig):

Source Variables	SS	Df	MS	F	p
Maritstat	0.175	2	0.088	0.174	0.840
ResMig	2.730	1	2.730	5.420	0.021
Maritstat*ResMig	0.034	2	0.017	0.033	0.967
ERROR	77.578	154	0.504		

The marital status groups were: single, separated, widowed, (etc.), monogamously married, polygamously married

e) Family Structure (Famstruc) and Migration (ResMig):

Source Variables	SS	Df	MS	F	p
Famstruc	2.198	2	1.099	2.248	0.109
ResMig	3.750	1	3.750	7.669	0.006
Famstruc*ResMig	0.353	2	0.176	0.360	0.698
ERROR	75.294	154	0.489		

The family structure of households were: nuclear, extended-lineal, extended-other

f) Adult Female Composition (Females) and Migration (ResMig):

Source Variables	SS	Df	MS	F	p
Females	2.348	3	0.783	1.584	0.195
ResMig	3.254	1	3.254	6.586	0.011
Females*ResMig	0.322	3	0.107	0.217	0.884
ERROR	75.096	152	0.494		

The family adult (15 years or above) female composition classes were: 0 or 1 female, 2 females, 3 females, 4 or more females

g) Ethnicity and Migration (ResMig):

Source Variables	SS	Df	MS	F	p
Ethnicity	1.339	4	0.335	0.672	0.613
ResMig	2.246	1	2.246	4.506	0.035
Ethnicity*ResMig	1.526	4	0.381	0.765	0.550
ERROR	74.785	150	0.499		

The ethnic groups were: WaKuria, WaIkoma, Natta/Wassenye, WaSukuma, and Others

h) Leadership Now (Leader) and Migration (ResMig):

Source Variables	SS	Df	MS	F	p
Leader	0.010	1	0.010	0.020	0.888
ResMig	3.063	1	3.063	6.181	0.014
Leader*ResMig	0.372	1	0.372	0.751	0.388
ERROR	77.300	156	0.496		

The leadership now categories were: yes or no member of household in village council or as household-cell leader

i) Technology (Ox-ploughing) and Migration (ResMig):

Source Variables	SS	Df	MS	F	p
Ox-plow	0.122	1	0.122	0.248	0.619
ResMig	2.080	1	2.080	4.246	0.041
Ox-plow*ResMig	1.280	1	1.280	2.613	0.180
ERROR	75.948	155	0.490		

The ox-ploughing categories were: used, or did not use ox-ploughing

j) Msaragambo and Migration (ResMig):

Source Variables	SS	Df	MS	F	p
Msaragambo	1.151	1	1.151	2.398	0.124
ResMig	1.547	1	1.547	3.215	0.075
Msaragambo*ResMig	2.108	1	2.108	4.383	0.038
ERROR	73.113	152	0.481		

The msaragambo categories were: had, or did not have msaragambo help in agricultural activity

k) Population Growth (Popgrow) and Migration (ResMig):

Source Variables	SS	Df	MS	F	p
Popgrow	2.685	4	0.671	1.350	0.254
ResMig	2.662	1	2.662	5.352	0.022
Popgrow*ResMig	0.461	4	0.115	0.232	0.920
ERROR	74.597	150	0.497		

The village population growth trend were: high population growth/net in-migration, low growth/net in-migration, some growth/no net in-migration, no growth/net out-migration, high decline/net out-migration

The gender of the heads of households, and their migration status, whether in-migrant or resident, had no separate or combined effect on the area cultivated per capita (Table 7.25a). The age cohort of the head of a household had a significant differentiating effect on the acreage of land cultivated per capita but there was no further differentiation by being a non-migrant or in-migrant household (Table 7.25b). Neither did the level of education of the head of the household have any significant influence on the acreage cultivated per capita (Table 7.25c) although the average levels of education of the heads of non-migrant and migrant households differed. A significantly larger proportion of the heads of migrant households had no schooling and fewer had 7 years or more schooling as compared to the heads of non-migrant households (Likelihood Ratio $\chi^2=7.685$, $df=2$, $p=0.022$).

The marital status, family structure and female composition of households were not in themselves associated with the variations in the acreage cultivated per capita by households but being a non-migrant or migrant household had differentiating effects on the use of the land per capita (Table 25d-f). However, the effects were not interactive.

Thus, sub-hypotheses (vii) and (viii) of hypothesis 12 could be accepted. Although some of the population movements in Serengeti district took place within ethnically-defined migration fields (see chapter 5), the ethnicity of the head of the household had no effect on the variation among households in the acreage of land per capita they cropped (Table 7.25g). Neither did ethnicity and migration status have any combined effects on the area cultivated per capita by households. Overall, the ownership and use of land in Serengeti district were not significantly differentiated according to the ethnicity of households and village policies appeared to maintain equity in the allocation of land per capita irrespective of the ethnicity of households.

Intra-village inequity has been attributed to the effects of differences in positions of power and leadership among villagers. The positions of leadership considered included membership in the village council or any village committee, household cell leader (balози) or deputy cell leader. A position of leadership did not favour households in their relative access to and use of land per capita (Table 7.25h). Leadership and migration statuses did not jointly contribute to a differentiation among households in their per capita area of land owned and cropped. Migrant households that had a member in a position of leadership before moving also did not differ significantly in the average acreage of land owned or cultivated per capita in the villages of relocation (results not tabulated). Having been a leader in the village of origin did not favour migrants in their relative access to land, and its subsequent use, in their village of destination.

Similarly, differences in the use of ox-ploughing (Table 7.25i) and migration status of a household had no combined effects in differentiating households in the average area they cultivated per capita. Whether households used or did not use msaragambo as extra-household labour, and whether households were non-migrant or in-migrants had no separate effects in influencing the average area cultivated per capita by the households (Table 7.25j). But the migration status of a household and the use of msaragambo had a significant combined effect on the average area per capita cropped by households. The differences in the average acreage cultivated per capita by migrant and non-migrant households and with respect to their use of msaragambo are shown in table 7.26.

Table 7.26 The Effects of Msaragambo and Migration on Acreage Cultivated per Capita: Serengeti District

Household Group	Mean Acres per capita	Std. Error (acres)	N
Non-migrants	0.921	0.075	94
In-migrants	0.713	0.088	62
Yes msaragambo	0.907	0.078	91
Non-migrants yes	1.133	0.088	62
In-migrants yes	0.681	0.129	29
No msaragambo	0.727	0.086	65
Non-migrants no	0.710	0.123	32
In-migrants no	0.745	0.121	33

Source: Household Survey, 1991.

Contrary to expectations, in-migrant households did not cultivate a larger but perhaps even a smaller average area per capita with the assistance of msaragambo. The reasons for this discrepancy could not be determined. The non-migrant households cultivated about 66% more acreage per capita using msaragambo than the area cultivated by the in-migrant households.

The village population growth and net migration trends during the 1978-1988 period had no significant effects on the variation in the acreage of land cultivated per capita (Table 7.25k). Overall, the population growth and net migration trends in the village did not have a differentiating effect in the cultivation of land per capita among non-migrant and migrant households. Village governments and their policies towards in-migration may have been regulating the rate of in-migration into villages but these policies did not adversely affect households, once accepted as in-migrants, in their access to and the use of land as compared to non-migrant households.

Overall, hypothesis 19 could be accepted as applied to the effects of migration status and gender, education, ethnicity, and the leadership status of the head of household on the average acreage per capita cultivated (or owned) by households. But, hypothesis 19 could be rejected as applied to the effect of the age of the head of the household on the average acreage per capita of land cultivated (or owned) by households. Hypotheses 20, 22, 23, and 24 could be accepted since differences in the marital status, type of family

structure, adult female composition, use of ox-ploughing technology, and population growth trends in the villages had no significant independent or joint effect with migration status on the mean acreage of land cultivated (or owned) per capita by households. Hypothesis 21 could be rejected since migration status and the use of msaragambo had a significant combined effect on the amount of land cultivated (or owned) per capita by households.

The preceding analysis indicated that migration status and most of the individual and contextual factors considered (education, ethnicity, marital status, family structure, adult female composition, leadership, the use of the ox-ploughing, village population growth and net migration trend) had no combined differentiating effects on the average acreage cultivated per capita by households in villages. The age of the head of the household was significant in differentiating households in their per capita acreage of cultivation but the migration status had no further differentiating effects. Only the use of msaragambo (communal working parties) had a joint differentiating effect on the mean area cultivated per capita depending on the non-migrant or in-migrant status of households. In addition, the earlier analysis of the land holdings and cultivation by households had indicated that ecological diversity of the habitats for plots and the distance, farthest and average, to cultivated plots were significant in accounting for the variation in land ownership and use by households (section 7.2.6).

The following analysis considers the combined effects of the demographic, social, economic, and technological structural factors of individual-household level, the ecological and locational characteristics of the land, and the village level demographic and locational aspects as determinants of inequity and variation in the acreage cultivated per capita by households. The variation in the acreage of land cultivated per capita by non-migrant and migrant households was expected to be determined by the following independent factors: the level of education of the head of the household (educat), the ecological diversity (Pdiverst) of plot locations on the catena, the average distance (in minutes walking time) to the plots (Avdist), the use of msaragambo for assistance (Msaragambo) and ox-ploughing (Ox-ploughing) in agricultural activities, the number of adult females in the household (Females), the population trend and proximity of the

village to the boundaries of Serengeti National Park (DistSnp), and whether the households were resident (NoSogeza) in their villages before 'villagization' of 1973-74.

It was expected that all these variables, except population growth trend and proximity to the Serengeti National Park, would positively affect the acreage per capita cultivated by households. Closer proximity to the national park was expected to negatively affect the area cultivated per capita because the availability of land would be constrained by the park as a barrier to settlement expansion and farmers would seek to minimize wildlife damage to their cropping activity by not locating their fields closer to the park boundaries. The villages were categorized into four proximity groups as: adjacent to park boundaries, upto 10 km, between 10-20 km, and between 20-30 km from the boundary. The area cultivated per capita was expected to be inversely related to the rate of population growth; more land would be available and cultivated in villages with declining populations and net out-migration.

The multiple regression of the dependent variable, natural log of the acreage cultivated per capita (Ln Cultpc) by non-migrant households on the above hypothesised variables could be modelled as in Table 7.27. Only the significant variables accounting for the variation in the acreage cultivated per capita are included.

**Table 7.27 Acreage Cultivated per Capita, Demography and Agroecology:
Non-migrant Households, Serengeti District**

Non-migrants: (N=93, adj.R²=0.231, S.E.Estimate=0.607)

Variable	Coeff.	Std. Error	Std. Coeff.	T	p(2 tail)
Constant	-0.693	0.171	0.000	-4.049	<0.001
Pdiverst	0.187	0.058	0.307	3.233	0.002
Msaragambo	0.505	0.135	0.348	3.752	<0.001
Females	-0.134	0.060	-0.211	-2.245	0.027

F=10.211, df=3, 89, p<0.001

Source: Household Survey, 1991.

The results indicated that the best fit model explained about a fifth (23.1%) of the total variation in the acreage cultivated per capita by non-migrant households. The factors that had a positive effect in determining the variation in acreage per capita cultivated were the ecological diversity of plot locations on the catena, and use of msaragambo in the household agricultural activities. These two factors had about the same strength in affecting the acreage cultivated but the mean distances to household plots, the education level of the head of household, the population trend and proximity of the village to the park had no significant influences. Neither did pre-'villagization' residency in the village have any positive effects on the land cultivated.

Overall, households headed by females did not have less access to and cultivate less land per capita than households headed by males. But, the adult female composition of the household had a negative effect on the acreage cultivated per capita by the non-migrant households. This was contrary to the expectation that a larger number of adult females would result in greater per capita cultivation since adult females work longer and bear the greater burden of agricultural activities (Tobisson 1986), which partly would have a positive affect on the area cropped. More likely, women do bear the burden of agricultural work but households with more adult females (including the elderly) are relatively disadvantaged in cultivating larger areas per capita.

Perhaps the explanation lay in the total labour inputs that women make in the type of ecological conditions, rather than size of the household's cropland. The number of women in households was negatively correlated to the the ecological diversity of catena locations for plots ($r=-0.22$). Thus, households with relatively more women may have been operating an agricultural system that was relatively less varied in land types on the catena as compared to non-migrant households with the average female composition and type of agroecology. Alternatively, households with more adult women perhaps operated a more intensified agricultural system with relatively less land as an input as compared with households that had fewer women.

Among migrant households after relocation, the best fit model was obtained without a natural log transformation of the acreage cultivated per capita by households (Table 7.28). The reason for this remained unclear. The significant linear, multiple regression

model accounted for about 40.7% of the total variation in the dependent variable. The ecological diversity of plot locations on the catena, the average distance (natural log transformed) to plots, the age cohort of the head of the household and the distance away from the park boundary had significant, positive effects on the acreage cultivated per capita by in-migrant households. The number of adult females in the household had a significant, negative effect on the acreage per capita cultivated. The ecological diversity of plot habitats had the strongest, and almost twice the magnitude of the other positive influences on the area cultivated per capita by households. The negative effect of a household's adult female composition was the second strongest factor determining the acreage cultivated per capita by households. The use of ox-ploughing or msaragambo had no significant effects on the acreage cultivated per capita.

As noted in chapter five, only around 30% of the populations of the villages surveyed in Serengeti district had not undertaken a lifetime move. The majority of households and people were migrants. The total of 173 households could be categorised into three groups by their residential history in the villages: (i) 94 households that

**Table 7.28 Acreage Cultivated per Capita, Demography and Agroecology:
In-migrant Households, Serengeti District**

In-migrants: (N=56, adj.R²=0.407, S.E.Estimate=0.579)

Variable	Coeff.	Std. Error	Std. Coeff.	T	p(2 tail)
Constant	-0.438	0.293	0.000	-1.496	0.141
Cohort	0.120	0.057	0.224	2.108	0.040
Females	-0.221	0.070	-0.332	-3.130	0.003
DistSnp	0.162	0.075	0.229	2.173	0.035
LnAvdist	0.141	0.062	0.247	2.291	0.026
Pdiverst	0.347	0.087	0.426	4.000	<0.001

F=8.549, df=5, 50, p<0.001

became resident in and since 1985 when socio-political instability began, (ii) 32 households that moved into the villages between 1973-1984, i.e. in the post-'villagization period, and (iii) those resident before 1973, i.e. the pre-'villagization' period. The average acreage of land per capita owned (Landpc) and cultivated (Cultpc)

by households among the 3 groups became less significantly different with increasing period of residence in villages (Table 7.29).

Table 7.29 Land Holding (Landpc) and Cultivation (Cultpc) per Capita by Duration of Household Residency in Villages: Serengeti District

Residence Period	Mean Acreage	Std. Dev (acres)	N
Landpc:			
Since 1985	0.787	0.729	87
1973-1984	0.899	0.721	32
Before 1973	1.144	0.848	44
Cultpc:			
Since 1985	0.739	0.669	84
1973-1984	0.843	0.586	32
Before 1973	1.124	0.823	44

Source: Household Survey, 1991.

Households resident since settlement consolidation cultivated about 94% of their average land holding per capita and those resident before 'villagization' cultivated about 98% of their holding per capita. The variation in the land holding per capita among the households of the 3 groups of residential duration was not significant (Bartlett's $\chi^2=1.61$, $df=2$, $p=0.458$); neither was the variation among the households in the land cultivated per capita significant (Bartlett's $\chi^2=4.524$, $df=2$, $p=0.104$).

The average land holdings per capita among the 3 groups of households were significantly different ($F=3.222$, $df=2$, 160 ; $p=0.042$) and the average acreage cultivated per capita by households in the groups differed significantly ($F=4.4$, $df=2$, 157 ; $p=0.014$). Only the mean acreages of land holdings and cultivation per capita by households resident since 1985 and those resident before 'villagization' were significantly different ($p=0.03$, $p=0.009$). The average land holding and area cropped by households resident before 1985 and before 1973 were not significantly different ($p=0.758$, $p=0.756$). Neither was the average land holding and acreage cultivated by households resident since 1985 and since 1973 significantly different ($p=0.347$, $p=0.193$).

The relationship between the acreage per capita cultivated by households and the effects of age (Cohort), household female composition (Females), proximity to the plots (LnAvdist) and the national park (DistSnp), the ecological diversity of plot habitats (Pdiverst), the use of msaragambo (Msaragambo), and the duration of residence in villages (Resdcat) could be modelled as in Table 7.30. It was expected that the acreage cultivated per capita by households would be positively influenced by the age of the head of household, the number of adult females in the household, the use of msaragambo in agricultural activities, and by households seeking more diverse habitats on the catena to cultivate and willingness to crop plots away from the homestead site. In addition, relatively more area would be cultivated per capita by households with a longer residency history in a village and in areas farther away from the boundaries of the Serengeti National Park. The values of both the acreage per capita and the mean distance to plots were transformed with the natural log function (i.e. Ln Cultpc, Ln Avdist).

Table 7.30 Acreage Cultivated per Capita (Cultpc), Demography, and Agroecology: Serengeti District

Non-migrant and In-migrant Households (N=144, adj. R²=0.278, S.E. Est.=0.679)

Variable	Coeff.	Std. Error	Std. Coeff.	T	p(2tail)
Constant	-1.676	0.244	0.000	-6.858	<0.001
Cohort	0.074	0.039	0.136	1.885	0.062
Females	-0.146	0.053	-0.202	-2.760	0.007
DistSnp	0.087	0.051	0.123	1.720	0.088
LnAvdist	0.121	0.048	0.190	2.537	0.012
Msaragambo	0.246	0.121	0.153	2.034	0.044
Pdiverst	0.242	0.056	0.329	4.362	<0.001
Resdcat	0.145	0.067	0.157	2.161	0.032

F=8.867, df=7, 136; p<0.001

The results confirmed the expected effects of most of the independent predictors on the dependent variable. The acreage cultivated per capita was greater for households with an increase in the age of the head of the household, in the distance away from the national park and from the homestead site to plots, with longer duration of residence in

the village (especially for those resident before 'villagization'), and for households using assistance from msaragambo and a greater diversity of catena habitats for crop cultivation. Contrary to expectations, the acreage cultivated per capita decreased relatively as the number of adult females in the household increased.

The above model summarized the significant components of the agroecology of the household and also indicated some policy issues. The significant effect of the variable denoting the residence history (Resdcat) captured the observed difference in the access to and use of land between those that moved into villages since the outbreak of socio-political strife (since 1985) and those resident before 'villagization'. Secondly, it highlighted the relative reduction in the acreage cultivated per capita by households with more adult females. Perhaps, this was a problem of equitable access to land, including to its ecological diversity, and to the means of cultivation for households with more adult females. On the other hand, households with more adult females may be operating a different, perhaps more intensified agroecological system relatively using less land as compared to households with fewer adult females. Third, the model affirmed the dominant role of ecological diversity for the household agroecological system and the greater benefits of being able to have access to msaragambo to complement the intra-household labour force. More recent in-migrants were relatively disadvantaged in their ability to procure the help of msaragambo. Fourth, more land per capita was cultivated in areas farther away from the national park but these areas had lower and less reliable rainfall. Fifth, households with older heads were cultivating more land per capita than households headed by younger persons. Finally, the issues of equity and the structure of household agroecology required consideration of how differences in household size affected variations in the concentration of land and the patterns of its use among households in different areas. Without careful adjustments for the differences in household size, intra-village and inter-village comparisons of equity and agroecological systems may be more apparent than real.

These main differences between recent migrants and other village residents could be tentatively attributed to the general circumstances of insecurity, and its associated social-economic and ecological pressures under which households undertook migrations and

village councils allocated land. Overall, village councils appeared to have allotted or approved land holdings quite equitably among households, especially before the outbreak of socio-political strife. The differences in land holding per capita of in-migrants since 1985 and earlier village residents were not dramatic. With improved security and an absence of socio-political strife, the slight trend in inequity in land holdings per capita allocated to new in-migrants could be arrested. The observed relative reduction in land cultivation associated with the female composition of households also needs attention. Both these issues could be redressed by apprising the village leadership of the insidious nature of the problem and facilitating the resolution of land issues among households, between villages, and competing land uses (wildlife conservation and agriculture).

No other external (extra-village) land policy pressures or interventions are required since village councils have, in a remarkable way, allocated land with considerable equity based mainly on variations in household size, while making available ecological diversity for cultivation, and improving proximity to plots for in-migrants. In addition, the allocations have been made without the significant negative effects of differences in gender, family structure except adult female composition, ethnicity, education, positions of power, and overall village demographic trends. Individual household needs, as mediated through its size, have been the main criterion shaping land allocation policies and practices by village governments.

In Serengeti district, migration had a contributing role to the processes that generate rural inequity and differentiation. In addition, the processes of such inequity and differentiation also include important ecological and locational factors associated with the household access to land holdings and the means to cultivate them. Equity issues involved not only the amount but attributes of land and the social resources to use the land effectively through reciprocal exchanges of assistance of various types between households. Recent (since 1985) in-migrant households were initially at a relative disadvantage in gaining the assistance of others in the village and this was subsequently mediated through the household's agroecological system. It is in the context of the structure of and changes in household agroecological systems and rural equity that Zelinsky's concepts of the changes in the 'spatial' locus and 'social' locus because of

migration need to be examined and are of theoretical and practical significance in the Serengeti district.

Chapter Eight

Migration in the Serengeti District: Conclusions

The inter-relation between migration and development is a subject of considerable theorizing, methodological analysis, and increasing field research. It has important public policy implications and consequences for rural development, urbanization, social justice and the well-being of people. In the case of the Serengeti district of Tanzania, the issue of migration is an integral aspect of understanding the evolution of humans and their global dispersion, of the development and improvement in the lives of the peoples who presently reside in the area, and of protecting its rich biophysical, scientific and aesthetic resources for the future. Consequently, the mobility and migration of people in and around the Serengeti district is an important research topic.

This chapter first summarizes the main research findings of the study of rural-rural migration in the Serengeti district. Next, it discusses the major theoretical, methodological and policy implications of the results. The third section of the chapter notes the limitations of the study, and the final section outlines some directions for future research on the inter-relation between rural migration, development and ecological conservation in the Serengeti area.

8.1.1 Summary of the Main Research Findings

The analysis of the patterns, processes and impacts of population growth and redistribution in the Serengeti district was carried out at three complementary levels. The macro-level study looks at the Eastern Lake Victoria Population Region, a demographic and agroecological region, as a conceptual and spatial framework to examine population and land use changes during the past century. Historical accounts and data from various population counts and censuses have been used to examine the regional and district level population trends.

Data on village population size and structure are available from the 1978 and the 1988 censuses. The meso-level analysis has focused on the demographic trends in the

census wards of eastern Lake Victoria region, and villages of the Serengeti district in particular. The rates of population growth and estimates of net migration were computed. The determinants of the changes in the population sizes of villages were examined. The meso-level results provided a sampling frame for a detailed, micro-level field study of the relationship between migration, agriculture and rural environment in the Serengeti district.

The micro-level study focused on the patterns, causes, processes and impacts of migration in a sample of seventy six households that had moved within and into the Serengeti district since 1985. These households were defined as 'migrant'. A sample of another ninety seven households that had not moved since 1985 was also studied for comparative purposes. These households were defined as 'non-migrant'. The two sets of households were derived through stratified random sampling in a sub-sample of eighteen of the district's fifty four villages. The sample villages were chosen in wards with net out-migration, little net migration, and net in-migration. They also represented variations in population size, and agroecological zones of the district (the upland plateau, and the hills/highlands). The relevant data were obtained from a survey conducted in Serengeti district in 1991. The main survey instruments were a village, and a household questionnaires. Some in-depth, unstructured interviews were also conducted.

The central hypothesis of this study contends that rural based migration involves a change in the 'agroecological locus', in addition to the changes in the 'spatial locus' and 'social locus' proposed by Zelinsky. The survey data were used to identify the interrelations between the places of origin of migrants, the reasons for and distances moved, the processes of relocation, re-establishing a home, and obtaining needed resources (especially land, farm tools and labour). The role of village local governments in regulating in-migration, and in the acquisition of land by households was also examined. Linear multiple regression analysis was used to model the household agroecological system, especially the inter-relation between the amount of land owned and cultivated, and household size, the average distance to land plots, the catenary location of these plots, and the use of extra-household labour. Two types of models were derived: the cross-sectional type showed the similarities and contrasts between the

agroecological systems of migrant households before and after moving, and of those households that had not moved; the longitudinal type portrayed the relationships over time between the characteristics of the land cultivated, the household demography, the use of labour resources, and locational features.

The impacts of migration are felt by those who move, their households, as well as the communities from which they originated and into which they relocated. The study considered the impacts of migration in the dynamics of household agroecological systems at the micro-level and of equity in access to land at the meso-level. Since agriculture is the main source of livelihood in the country, these issues are of great importance to the well-being of both migrants and those who have not moved, and in promoting rural and agricultural development in Tanzania.

The several findings of the macro, meso and micro level analyses are summarized in the following sections. The first set (A) of findings pertain to the patterns of population growth and redistribution, the second set (B) deal with the determinants and processes of migration, and the third set (C) outline the impacts of migration on the households that moved and the community into which they resettled.

8.1.2 The Main Research Findings on the Patterns of Population Redistribution

A1. Mobility and migration have complex and ancient antecedents in the Serengeti district and eastern Lake Victoria region, from the earliest known evidence of hominid movement about 3.5 million years ago, to the peopling of the district and the region by continental migrations since the late Stone Age. The movement of people has also remained the most conspicuous link between communities and places in the past century. Much of the population redistribution since the 1890's has been confined in the area between the shores of Lake Victoria in the west and the Gregory Rift Valley in the east. This spatial unit incorporates a demographic and agroecological system that can be analytically conceptualized as the Eastern Lake Victoria Population Region. Its population increased from about 1 million persons in 1934 to around 3.3 million people in 1988. Spatially, the general trend was a redistribution of population from the lakeshores

towards the upland plateau and hills/highlands. Local population changes in the Serengeti district were and are interlinked to the regional demographic and agroecological trends as mediated via spatial and temporal lags.

A2. Four main phases, of varying durations and characteristics of demographic changes, can be identified in the past century. The first phase was the Agroecological Collapse (early 1890's to mid-1930's) that depopulated much of the eastern lake region because of the effects of rinderpest, sleeping sickness, droughts and famines. Generally, people retreated from the areas affected by natural catastrophes to concentrate in the lakeshore areas. In the Serengeti district, the local concentration of population in the Ikoma, Natta and Issenye areas and around the Ikorongo mountains declined. But in areas not affected by sleeping sickness, for example in Ukara Island of Lake Victoria, the intensification of agriculture supported very high population densities on poor granitic soils.

The second phase involved an Agroecological Recovery (mid-1930's to early 1970's) during which human and livestock populations grew rapidly and expanded into and beyond the areas of agriculture abandoned earlier. The high density lakeshore areas were the main zones of origin. The expansion caused concerns about the survival of the rich wildlife of the region and several game sanctuaries, for example the Serengeti National Park and Maswa Game Reserve, were created. Their establishment altered the earlier patterns of migration. Some people were also moved to establish the protected wildlife areas. Initially, the population of the districts near the lakeshores grew quickly and moved closer to the Serengeti district. Later, and beginning in the 1950's, their expansion continued into west and southwest of the district (Tanner 1961). The minor concentration of people in the Ikoma, Natta and Issenye areas began to grow and redistribute locally. People also started to move from the Tarime highlands and into the north-eastern areas of the Serengeti district. There was some rural immigration from Kenya. This phase of in-migration was especially pronounced during 1950's-1960's and the spread of settlements continued until it became restricted by the wildlife sanctuaries.

The third phase was the 'Villagization' (1973-1974) of scattered homesteads in a strategy aimed to transform agriculture, improve the provision of social services, and promote rural development. It involved a nation-wide initiative to alter population distribution unlike earlier governmental interventions that were local and in reaction to problems of disease, overpopulation and ecological deterioration. 'Villagization' reduced the rates of rural inter-district movements but was associated with rapid urbanization. Immigration from Kenya almost ceased and some earlier immigrants returned there. Within villages, settlement usually comprised of closely located huts lined along the major road. Local village governments were instituted and empowered to allocate land to its residents, and to register and operate the village, if desired, as a co-operative. Some areas were cultivated by the villagers as a jointly-owned, communal (ujamaa) effort.

During the fourth, 'Post-Villagization' phase, there were several regional and local trends. Overall, the population flows from the southern portion of the Eastern Lake Victoria Population Region were redirected towards the south and west into central Tanzania and the Kahama and Geita districts. The rate of urbanization of the large centres, for example Mwanza city and Musoma town, decreased greatly but the growth of smaller district headquarters, for example Bunda and Mugumu, accelerated. High population growth and in-migration continued into the wards of the Bunda and Tarime districts that are adjacent to the Serengeti district. This growth increases, in turn, the potential for further movements into Serengeti district.

The population of Serengeti district grew by an average rate of about 2.2% per year between 1978 and 1988. With an annual rate of natural increase of about 2.8% per year, there was an overall net trend of out-migration from the district. Two distinct temporal trends could be identified. Until 1985, the district remained an area of slow net in-migration after 'Villagization'. Within villages, the communal agricultural activity was reduced and/or abandoned, the closely located homes dispersed, and the pattern of cultivation became less compact than that from 'villagization'. After 1985, an outbreak of banditry, cattle rustling and socio-political strife caused net out-migration, especially from the Mugumu Rural ward. The trend was a reversal of the pattern of in-migration

since the 1950's. Some people moved to Mugumu town for refuge, others migrated to safer villages within the district, and to neighbouring districts and areas of 'ancestral' origin (e.g. Tarime highlands, Bunda district, Bariadi, etc.). Some villages within the district had rapid population growth and net in-migration, especially in the ecotone of the upland plateau and the hills/highlands and more distant from areas of strife. Return movements began after 1990 following improvements in security. Overall, migration has had a significant influence in population redistribution in the Serengeti district and its regional settings and research hypothesis 1 could be accepted.

A3. Tanzanian censuses do not provide a breakdown of the types of rural migrants, and for sub-regional spatial units. The sample of 1,234 persons in Serengeti district showed that about 30.1% of the people had not moved during their lifetime; this result confirms the general thrust of the macro-level analysis that has indicated high mobility of Serengeti district's population. Most moves were primary (33.7%), the second largest proportion consisted of repeat movers (24.5%). Return migration (7.1%) is an important component of the population flows: about 3.7% were migrants who returned to their place of birth, and 3.4% returned to places of previous residence, other than their birth place. Some of the migration involved multiple return and repeat movements from a place of residence, and were examples of more complex, for example 'push-pull-push back-pull back' types of movements suggested by Nurun Nabi and Krishnan, rather than simple 'push-pull' types of migration.

A4. Census data based on place of birth and place of enumeration questions generally underestimate the total number of lifetime moves. Studies of residence history are most useful in assessing the total number of lifetime moves but few such studies have been conducted in the rural areas of developing countries because of the costs and research effort involved. Residence history analysis indicates that the people of Serengeti district are mobile rather than sedentary. Among the sample population surveyed, the maximum number of migrations was twelve and about 54.2% of the sample population had made up to two migrations. Males and females did not differ in the average number of lifetime

moves made. The average number of lifetime migrations was the lowest for those under age fifteen years (0.63); increased with age until a maximum (2.27) for the 35-44 age cohort; and, then declined to an average of 2.18 moves for those above fifty four years of age.

8.1.3 The Main Research Findings on the Causes and Processes of Migration

The macro-level analysis based on census data is most useful to understand the patterns of population distribution and may help to infer, rather than identify, the determinants of migration. This analysis is most useful for development planning in large areas, but it does not provide any information about the specific causes of migration, the distances moved, processes of choosing destinations, the means of movement, the tasks of resettlement and acquisition of resources. Data from the 1991 village and household surveys conducted in the Serengeti district provide some insight into the processes associated with migration. The main research findings on the causes and processes of migration are summarized below.

B1. Why people move is an important question in migration studies. Population pressure has often been considered as a cause of rural migration, notwithstanding the difficulties involved in conceptualizing and defining population pressure. The relative availability of land and the structure of the population are among the possible sources of influence on population trends. Population growth and density data for administrative divisions in the eastern Lake Victoria region, including Serengeti district, showed that areas farther away from the shores of Lake Victoria and of lower density (persons per km²) in 1957 had higher average growth rates per annum during 1957-1967. But population densities and demographic changes during 1967-1978 and 1978-1988 were not related. Thus, hypothesis 5 was rejected for the 1957-1967 period, but accepted for the 1967-1978 and 1978-1988 periods. The ward level analysis indicated that wards with lower population densities and dependency ratios in 1978 had higher population growth

and net in-migration rates during 1978-1988. Population growth and net migration were also higher during 1978-1988 in wards with a larger proportion of its land cultivated in 1978. Since population density, the dependency ratio, and the proportion of land cultivated in the wards in 1978 had some effects on population growth and net migration rates during the following decade, the contentions of hypothesis 6 about their roles could be rejected. As the agroecological conditions in the wards had no significant influence on the population growth and net migration trends, hypothesis 6 about the role of agroecological conditions could be accepted.

B2. Data on village populations became available from the 1978 and 1988 censuses. In 1991, there were fifty four villages in Serengeti district, and Mugumu town is the only urban centre. Linear multiple regression modelling was used to infer the determinants of total population change and net migration in the settlements during 1978-1988. Overall, the larger settlements in 1978 had lower mean annual percentage growth rates during the following decade. There was also a significant neighbourhood effect; the rates of population change among pairs of nearest neighbouring settlements during 1978-1988 were positively related. The larger settlements in 1978 had greater estimated net out-migration rates during the following decade; smaller settlements had greater net in-migration rates. Settlements with net in-migration or out-migration during 1978-1988 were usually located near each other (nearest neighbouring settlement). But, the combined effects of population size class in 1978 and the neighbourhood effects in total population growth and net migration accounted for only about 26-29% of the total variation in the mean annual rates of net migration and total population change in settlements during 1978-1988. Several villages lost population after 1978 because they split up and ten new villages were established nearby, for example Machochwe was split into Machochwe, Nyamakendo and Mrenga. The distance between nearest neighbouring settlements and their location relative to the main roads, to the Serengeti National Park boundary, to rivers, and the number of roads links between settlements (connectivity) had no significant effects on the rates of total population growth or net migration. Neither did their location in the upland plateau vis-a-vis in the hills/highlands. Consequently, sub-

hypothesis (i) of hypothesis 7 could be rejected but sub-hypotheses (ii), (iii), (iv) and (v) could be accepted. Sub-hypothesis (ii) could be accepted since the neighbourhood effect operated independently of the magnitude of distance between nearest neighbouring villages.

B3. The village and household survey data were useful in explaining the causes, at the household level, of population movements since 1985. A majority of households (56.6%) moved because of multiple reasons; those who stated a single reason for migrating were mainly return migrants and those who moved for reasons related to employment (e.g. transfers, retirement). The outbreak of socio-political strife in the district since 1985, the level of education or gender of the respondent did not affect the number of reasons stated for moving.

B4. Households moved mainly for 'resources' (31.6%) and 'social and psychological' (31.6%) related motives. Those seeking 'resources' included households desiring more/better land and pastures, usually caused by inadequate food and income. Landlessness and a lack of land ownership were not a cause of migration. Those who moved because of 'social and psychological' reasons migrated to reunite with their family and due to illness, death, strife and insecurity. Deaths and morbidity were important reasons for household migration (21%). Households (18.4%) also moved because of 'social-resources' related reasons, for example family disputes and insecurity, which made households seek land in other villages. Floods and impacts of wildlife, employment related reasons, and return movements were also among the other causes of migration (18.5%). The main types of reasons stated for migration were not significantly associated with the gender or the level of schooling of the head of the migrant household. Overall, the average distances moved by households for 'resources', 'social-resources' and 'social and psychological' types of reasons did not differ, either. Thus, hypothesis 8 could be accepted.

B5. The 'push-pull' model provides a useful, but often greatly simplified, abstraction of the factors causing migration. It was difficult to categorize the various reasons for migration into exclusively 'push' or 'pull' types of factors. But constellations of reasons could be identified that suggest 'push' or 'pull' effects. 'Push factors' were the main cause for migration of households (65.8%) in the Serengeti district. About 35.5% of households were unable to satisfy their food needs, and about 17.1% were unable to satisfy their income needs. The failure to satisfy food needs often caused households to seek more, and/or better land. Illhealth and deaths also compelled many (15.8%) households to move, and a lack of security due to socio-political conflict caused some of these deaths. Most of the migration (89.5%) was aimed to satisfy subsistence and social needs for survival. The most important 'pull factors' of migration were social, and included the desire of people to become united with their family, kith and kin. Few households moved to achieve social mobility, either to obtain more or better land, or employment. Households attributed a greater likelihood of moving to 'push' factors (e.g. lack of security, land, food) and aimed at satisfying basic needs than to improve income.

People may move not only because of absolute deprivation but due to relative deprivation or inequalities within their communities. Households in the Serengeti district did not move because they perceived themselves as relatively deprived when compared to the majority of other people living in the villages that they moved from. Migrant households did not rate their possession of land and livestock, their levels of satisfaction with income, food sufficiency, social relations (intra-family, with other villagers and village leaders, etc.), and overall quality of life as inferior to that of the majority of their fellow residents in the villages of origin. Thus, hypothesis 11 could be accepted. Only the group of households that moved for 'resources' related reasons rated the fertility of their land inferior as compared to others and thus, in this particular case, hypothesis 11 could be rejected.

B6. The association between education and migration has been hypothesised in many migration studies. Non-movers and migrants of various types (primary, repeat, return) did not differ significantly in their average level of schooling (4.1-5.0 years). Only those

with above primary education had a higher average number of lifetime migrations (3) than persons who had not been to school or had up to primary education (1.8-1.9 moves). This dichotomy in the incidence of migration may be partly due to the availability of primary schooling in all of rural Tanzania. Those with above primary schooling moved for more education or for other opportunities elsewhere, including employment in rural areas.

B7. The majority (39.4%) of first lifetime movements of persons took place within the Serengeti district. There were in-migrants from Tarime district (14.4%) to the north, the Bunda district to the southwest (11.8%), and the districts to the south mainly inhabited by the WaSukuma (11%). There were also Kenyan immigrants (1.9%). The most important destinations for those who had moved from Serengeti district were the Bunda area (2.2%, rural and urban), Tarime district (0.9%) and Kenya (0.9%). Only 0.5% had made their first lifetime move from Serengeti district to the districts farther south. All these out-migrants had then returned to the Serengeti district. These survey results were in agreement with the analysis of the census data.

Within Serengeti district, there were three main ethnically-based migration fields. In the hills/highlands settled predominantly by the WaKuria, there were two distinct migration fields that appeared to form clan territories. The first clan-based migration field consisted of the WaNyabasi-Abarenchoka areas. Members of these clans could co-reside and move among its eight villages. The second, WaKira migration field consisted of five villages that were settled only by WaKira. Both these fields had considerable net out-migration during 1978-1988, especially after the onset of socio-political strife in the Serengeti district in 1985. Some of the migrants moved to Mugumu town but most moved to their ancestral areas in the Tarime highlands. The third, mixed ethnicity (e.g. WaIkoma, Wassenye, Natta, WaNgoreme, etc.) migration field had nineteen villages located in the western and southern portions of the Serengeti district. It extends over the upland plateau. The degree of ethnic mixture varies in different parts of the migration field.

'Villagization' had much reduced the role of ethnically demarcated migration fields

but the outbreak of socio-political strife in the Serengeti district revived their importance in migration processes. Many people moved to live within their clan areas, and also avoided seeking residence in villages populated by ethnic majorities that were considered traditional rivals. Ethnicity was a less significant factor in migration patterns in the southern part of the district although these areas were generally devoid of WaKuria. Mugumu town was the only area where all the major ethnic groups found in the Serengeti district co-resided in significant numbers.

B8. The relationship between migration and the distance moved has been an important topic of geographic research. Among the sample of migrants surveyed in Serengeti district, there was an inverse relationship between the number of persons that moved since the 1988 census and the distance migrated. About 24.3% of all the first lifetime moves were less than 10 km, and about 58% of the were within 30 km distance. Thus, hypothesis 2 could be rejected. The distinct 'migration fields' and the presence of wildlife sanctuaries were among the factors that complicated the inverse relationship between the volume of migrants and the distances they moved. Males and females (above age 14 years) did not differ in the distances that they migrated in their most recent move. Nor did the level of schooling attained by a migrant influence the distance moved. Hence, hypothesis 4 could be accepted. Previous migration experience did not positively affect the distance moved in the subsequent move or moves. But, first-time or primary moves were on the average about half as much (61.4 km) the distance as repeat migrations (40.7 km). Return migrants did not differ significantly from repeat migrants in the average distance moved in their most recent migration. Hypothesis 3 could be rejected as applied to differences in the mean distances moved by primary and repeat migrants but accepted as applied to the mean distances moved by return migrants and repeat movers.

B9. The choice of a migration destination among several alternatives is a critical decision required of migrants. A key element of this choice depends on the information about potential destinations. Most of the migrant households (88.2%) surveyed in the

Serengeti district did not consider any other location as a migration destination, except the one they moved to. Return migrants also did not consider an alternative place to settle in. Only 9.2% of the migrant households considered other places. Those moving within and into the Serengeti district depended primarily upon their own prior personal experience of the village that they migrated to as the source of information about potential places to settle. About 13.2% of the migrants had previously made a visit to the destination village and 46% had made several visits. Contacts made with relatives were the second most important source of information (22.4%); these contacts were made in places other than the village of migration destination.

B10. The Ujamaa Villages Act (1975) empowered village local governments to allocate land to village residents. A household could only settle in a village if its local government granted residency rights and allocated land to the household. This power also indirectly allowed village governments to regulate the rate of in-migration into their villages depending on their particular population and resource situations, especially the availability of land. Five different types of village government policies could be identified ranging from no controls on migration in areas of plentiful land to a strong regulation of the rate of in-migration as dependent on the rate of out-migration and land availability in areas of land shortages. Village governments could also determine who the in-migrants were by requiring proof of good character and conduct in their previous village of residence. Generally, village governments first allocated land made available from out-migration to needy residents and then to in-migrants. Hence, out-migration, land availability and in-migration became inter-related in their operational policy. One village even granted residence rights under probation to establish good citizenship. But no villages encouraged out-migration or stopped in-migration. Some of the other problems faced by villages included encroachment by unauthorized settlers, land shortages, and boundary demarcation.

8.1.4 The Main Research Findings on the Household and Community Level Impacts of Migration

The decision to move by a household initiates a series of impacts and processes that have consequences for the household, its communities of origin and destination. Mabogunje noted that the final step in the migration process was the assimilation of the migrant into the host community. Much of this kind of work in migration studies has focused on urban areas and on the social aspects of integration. How this assimilation, which is not instantaneous and often unsuccessful, takes place in rural communities is little understood. The migration impacts and associated processes of adjustment/adaptation in household agroecological systems have been largely ignored. And yet, these issues have implications for public policy and development planning, especially in Tanzania where the rural livelihood depends on agriculture and its development. Some of the main impacts of migration on the agroecology of households and communities in the Serengeti district are summarized below.

C1. One of the first impacts of the decision to move by a household is the duration and degree of disruption the relocation process causes in the normal household dynamics. Generally, migration in Serengeti district was short-distance and short-duration, and strongly destination orientated. The move to a new village of residence in the Serengeti district was accomplished quickly. About 80.3% of the households moved to their migration destination within a day, another 7.9% households stayed overnight enroute and only 5.3% of the households moved over a period between a month and a year. Nearly all the moves were directly to the destination village; only one of the seventy six migrant households had briefly resided in another village. The majority of the moves were accomplished by walking to the destination.

C2. A second impact of the decision to move involves the extent to which the relocation alters the composition of the household, either temporarily or permanently. Changes in the household size and composition are important for the availability of labour involved in the processes of re-establishing the homestead and agriculture, and in

its future demography and movement. About 69.7% of the migration of households was carried out by all its members moving together; in the case of 14.5% of households, the head (usually male) of the household had preceeded first and was joined by its other members latter. The parents moved first from 3.9% of the households and only in the case of two households (2.6%) the wife moved first and alone to the destination village.

C3. Among the major tasks required of a migrant in the destination village was to re-establish a home, and acquire and prepare cropland for cultivation. This was accomplished in several ways. About 25% of the migrant households had bought a home in the destination village that they were able to occupy after arrival; another 7.9% were building new huts in the homestead site they had bought. The majority of in-migrant households (51.3%) built or were building a home, and only 2.6% households inherited a homestead. Some households (7.8%) had rented a home, boarded temporarily with other villagers, or had been allocated the homesteads of out-migrants by the village government. Most in-migrant households (52.6%) acquired their cropland from the village government, another 13.2% secured land associated with the purchase of a homestead, and 7.9% cleared unused land. About 10.2% of the households were able to obtain a share of cropland from family and friends, and only 2.6% households inherited land. Return migrants often acquired the land they had previously cropped. Overall, many in-migrant households commenced the processes of establishing a home and acquiring cropland even before their arrival in the destination village although the majority did so after relocation.

C4. The physical tasks of establishing a home and agriculture by in-migrant households also contribute to processes of developing new social networks. Most of the households (57%) stayed on their own after their arrival in the destination village but many (42%) lived initially with other villagers, especially with immediate family and other relatives residing in the village. Half of the in-migrant households had help from other villagers in building a home and preparing land for cultivation; some were loaned farm tools and oxen for ploughing; and, a few were given food. Communal work group

(msaragambo) also provided assistance and were usually rewarded with food and drink in appreciation. Reciprocity, church affiliations, clan kinship, family ties and friendships formed the components of a multi-channeled, multi-layered social network of assistance to in-migrant households. The network also provided mechanisms through which migrants could establish beneficial links for longer term social and psychological well-being and for the operation of the household agroecological system.

C5. Migrants did not cut all ties with their communities of origin after arrival in their destination. But, the relocation did affect the migrant's social interactions and bring about changes in their 'social locus'. About 36.8% of the households did not make any visits to their previous place of residence while 43.4% households had members who made many visits. Another 17.1% of the migrant households made a few visits. The visits were usually made to family and relatives; others went to markets and shops, and some went to tend/harvest crops (e.g. cassava) in the villages of origin. The pressure of work was the main cause of migrants (11.8%) not visiting their previous places of origin. Others (10.5%) did not have any reasons to visit. The following or the next two cropping seasons after arrival in the destination were the most demanding in terms of re-establishing the household agroecological system.

C6. Among the more long term impacts of migration on the household was the change in the 'agroecological locus', in addition to the changes in the 'spatial locus' and 'social locus' noted by Zelinsky. These changes could be determined by comparing the migrant household situations before and after moving, and with those households resident (non-migrant) in the destination village. At the macro-level, the changes involved moves within and between three agroecological zones of different geology, altitudes and topography, climate, soils and vegetation (upland lakeshore, upland plateau, and hills/highland). Among the 76 migrant households surveyed in the Serengeti district, the majority of the moves (77.6%) took place within the same agroecological zone. The rest of the households moved from the drier, upland plateau to the wetter hills/highlands (10.5%), and from the hills/highlands to the upland plateau (6.6%). Another 5.3% of the

households moved from the lacustrine upland lakeshore to the granitic plateau and hills/highland. The portions of the Mara river valley in Serengeti district that can be categorized as upland lakeshore are not settled, mainly due to the hazards of flooding and diseases.

At the micro-level, household migration also involved changes in the location of their cultivation plots on the local catena, in the variety of land types available for growing crops, and in the associated number of crops grown. The local catena could be subdivided into five constituent land types (ridgetop, upper side-slope, middle slope, lower slope, drainage/mbuga). About 40.8% of the migrant households had completely different types of land for their plots and only 6.6% had the same land types before and after migrating. The number of crops grown was positively related to the number of land types cultivated on the local catena. But, migrant households did not significantly alter the average number of land types they cultivated on the local catena and the number of crops they grew by moving. Thus, sub-hypotheses (v) and (ix) of hypothesis 12 were accepted as applied to the differences in the average number of land types on the catena and the mean number of crops grown by migrant households in their villages of origin and destination. But migrant households cultivated, on the average, a smaller variety of land types and thus crops (both before and after moving) than the non-migrant households in the destination village. Thus, sub-hypotheses (v), (vi) and (ix) of hypothesis 12 could be rejected as applied to differences in the use of land types on the catena and the average number of crops grown by migrants in their destination villages and the other, non-migrant households in their host communities. All households grew, on the average, about twice as many crops as the variety of land types they had on the local catena but non-migrant households had a more intensive cropping pattern than migrant households before and after moving.

C7. There were also changes in the distance (in minutes of walking time) from the homestead to the cultivated plots after migration of households. The nearest plots prior to migration were more distant (average time=24.7 minutes) than after moving (average time=7.7 minutes). Households that moved also significantly improved their proximity

to the most distant plots cultivated (average time=13.9 minutes) as compared to before moving (average time=42.6 minutes). Overall, migration improved the proximity to the plots of land cultivated by households that moved. Thus, sub-hypothesis (iii) of hypothesis 12 could be rejected as applied to differences in the average distances to the nearest, farthest and all plots cultivated by migrant households in their villages of origin and destination. After relocation, the migrant households did not differ in the mean distance to their nearest plots from the non-migrant households (average time= 9.7 minutes) amidst whom they resettled. Neither did the average distance to the farthest plots cultivated by the migrant households (average time=13.9 minutes) differ significantly from that of the non-migrant households (average time=20.8 minutes). Thus, sub-hypothesis (iii) of hypothesis 12 could be accepted as applied to the differences in the average proximity to the nearest, farthest and all plots cultivated by migrant households and other non-migrant households in the destination villages.

C8. A need for land was among the dominant reasons for household migration in the Serengeti district. Almost all the households in Serengeti district used all the land they owned in their cropping system because surplus land can be reallocated by the village government to those who need it. Hypothesis 18, as applied to differences in the mean acreage per capita of land owned and cultivated by households could be accepted. Households that moved had experienced, on the average, a reduction in the amount of land they owned/cultivated before and after moving. After relocating, migrant households cultivated less land (mean=4.1 acres) than the non-migrant households (mean=6.6 acres) of the destination community. Thus, sub-hypothesis (i) of hypothesis 12 was rejected. Households that did not move cultivated, on the average, about the same amount of land as the migrant households before moving (mean=5.8 acres). Sub-hypothesis (i) of hypothesis 12 was accepted as applied to differences in the mean acreage cultivated by migrant households before relocating and non-migrant households. The sub-hypothesis was also accepted as applied to the differences in mean acreage cultivated by households before and after moving. The differences in the variances of land cultivated by migrant households before and after moving made it difficult to statistically ascertain, using

Tukey's HSD test, significant differences in the mean acreages cultivated by the households before and after moving.

Land ownership and use became more equitable among migrant households after relocating as compared to before migration. At the individual household level, 58% lost land, 11.3% had no change in the size of their land holding, and 30.6% gained land by moving. The loss of land was positively related to the size of the land holding before migration and the gain in land holding after moving was inversely related to the land holding size before moving. Larger land owners prior to migration generally lost land after moving, and smaller land owners prior to migration gained land after moving. Migrants who moved shorter distances did not differ in their average land holding than longer distance migrants. Households that moved for more/better land did not relatively acquire more land than those that moved for other reasons. Thus, hypothesis 9 could be accepted as applied to the differences in the average amount of land and land per capita acquired by households moving for different major reasons (resources, social, resources-social).

C9. The relationships between the size of land holdings cultivated and household size and structure, status, labour resources, and technology are of critical importance to the operation of the household agroecological system, its needs and ability to satisfy subsistence requirements, and overall well-being. The relationship can be examined individually or jointly. Labour and technology are important components of household agroecological systems and their intensification (Boserup 1965). The household is the major source of labour for agricultural activities in Serengeti district. Mean household size was larger than in many other parts of the country. Migrant (both, before and after moving) and non-migrant households did not differ in mean size but they varied significantly in their numbers of agriculturally active adults. The district's migrant households had almost twice as many widowed and divorced/separated households as compared to those who had not moved. Thus, hypothesis 13 was accepted as applied to the differences in mean household size of migrant (both, before and after moving) and non-migrant households. But, the variations in the household sizes within the three

household groups (migrant before moving, migrant after moving, non-migrant) were significant.

Non-migrant, and migrant households (both, before and after moving) did not differ in their use of extra-household labour composed of relatives but non-migrant households made significantly greater use of paid workers and *msaragambo* (communal work parties) than migrant households before and after moving. Surprisingly, in-migrant households assisted by *msaragambo* cultivated less acreage per capita than those in-migrants that had no help from *msaragambo*. Thus, hypothesis 14 could be accepted as applied to the differences in the use of assistance of relatives (extra-household members) as a labour source by migrant (both, before and after moving) and non-migrant households, but rejected as applied to the differences in the use of *msaragambo* and paid labour by migrant (both, before and after moving) and non-migrant households.

A larger proportion of non-migrant households used ox-ploughing than migrant households after moving. Migrant households did not differ in their use of ox-ploughing before and after moving. The difference in the use of ox-ploughing was not associated with the ownership of oxen and ploughs. There were no significant differences in the average ownership of livestock of different types (eg. cattle, oxen, goats/sheep) by migrant and non-migrant households (both before and after moving). Thus, hypothesis 15 could be accepted. But, livestock, including oxen ownership was less equitable among migrant households who had suffered significant losses due to rustling and disease than among the non-migrant households. The variation in livestock ownership, including oxen, was greater among migrant households after relocating than among non-migrant households.

C10. The relationship between the acreage of land cultivated and its determinants among the households that migrated (before and after moving) and had not moved was complex and non-linear. The significant determinants accounted for 28-43% of the variation in the acreage of land cultivated by the three groups of households. Household size had a positive effect on the acreage of land cultivated by all the three groups of households. Household size had a greater effect on the cultivated acreage among migrant

households after moving than before moving, and among non-migrant households. The diversity of land types cultivated on the local catena positively influenced the acreage of land cultivated only by migrant households after relocating and by non-migrant households. Its effects on acreage cultivated was greater among non-migrant households than migrant households. The farthest distance to cultivated plots significantly affected the acreage cultivated only by the migrant households after moving. The cultivation of cotton as a cash crop and the number of oxen owned influenced the acreage cropped only by migrant households before they moved. The acreage cultivated by all the three groups of households was not influenced by their proximity to the Serengeti's wildlife, the agroecological zone they resided in, the use of extra-household labour, the gender or position in the village leadership of the head of the household.

The number of crops grown by non-migrant and in-migrant households in the destination villages was significantly and positively influenced by the total acreage and number of plots cultivated, the diversity of land types cultivated on the local catena, and the use of ox-ploughing. The average distance to plots inversely affected the number of crops grown. Plot fertility did not affect the number of crops grown but the total number of plots cropped was significantly and positively influenced by the number of adults in the household, the farthest distance to plots and their average fertility. There were no significant differences in the mean ratings of plot fertilities made by migrant households (both, before and after moving) and non-migrant households (results not tabulated in text). Thus, sub-hypothesis (iv) of hypothesis 12 could be accepted.

C11. Linear multiple regression modelling of the agroecological systems of the households based on land owned and cultivated per capita showed some significant structural differences as compared to models based on land owned and cultivated by the household. Among the non-migrant households, the use of msaragambo and the diversity of the types of land on the local catena had significant and positive effects on the acreage cultivated per capita. The number of adult females in the household had a negative influence on land per capita cultivated. These variables accounted for about 23% of the total variation in the land cultivated per capita and the regression model was log-linear

(dependent variable was natural log transformed). Among in-migrant households, the age of the head of the household, the distance to the boundary of the Serengeti National Park, the average distance to the plots, and the diversity of land types cultivated on the catena positively influenced the land cultivated per capita. The number of adult females in the household had a negative effect on the acreage of land cultivated per capita. The five significant independent variables accounted for about 41% of the total variation in the acreage of land cultivated per capita and the relationship between the dependent variable and predictors was linear.

C12. The majority of the residents of the villages had moved in some time during their lifetimes. The sample of households surveyed could be divided into three groups depending on the length of residence in the villages: those resident since 1985, those who moved in during 1973-1984, and households living in the village before 1973. Households that moved into the villages since 1985 had significantly smaller mean size of land holdings and a smaller average size of land cultivated per capita than households resident in the villages prior to 1973. Households that moved into the villages during 1973-1984 did not differ in their mean holding size and land cultivated per capita from households that moved into the villages since 1985, and from households resident in the villages before 'villagization' in 1973. The land per capita cultivated by the households was positively influenced by the age of the head of the household, the distance to the boundaries of the Serengeti National Park, the average distance to the plots, the use of msaragambo, the diversity of land types on the local catena cropped, and the length of residency in the village. The number of adult females in the household had a negative effect on the land cultivated per capita. The diversity of land types cultivated on the catena had about twice the effects of access to msaragambo and the length of residence in the village, and more than twice the effects of age of head of household, and proximity to Serengeti National Park on the amount of land cultivated per capita by households. The regression model accounted for about 28% of the total variation in the dependent variable.

C13. Perhaps the most important impact of migration on the household is the success or failure of the household strategy of moving to achieve its goals and needs. The success of migration as a strategy to improve life situations was evaluated through the changes in the attitudes and perceptions of migrants who comparatively rated their specific and general life situations before and after moving. A majority of migrant households rated themselves better or much better off in land, soil fertility, security, environmental and health conditions. On the other hand, more households rated a worsening, rather than improvement, in the availability of clinic services, transport, costs of farm tools and inputs, and prices of crops after migrating. Overall, about 72% of the households rated themselves better or much better off in their place of current residence. Thus, hypothesis 24 could be rejected. Households had limited knowledge about the situations outside their places of residence. More than a half of the households were unable to compare their own life conditions with those in neighbouring village, town and the rest of the district. Among those who were able to do so, most rated conditions better in the neighbouring town, and about the same in the neighbouring village and other villages of the district and region.

C14. Equity and social justice are among the major goals of Tanzania's development strategies. How migration contributes to rural differentiation is an important aspect of the community level impacts of population movements. Comparisons in access to land need to consider the differences in household size, especially when household size and sizes of land holdings and land cultivated are significantly related. The migrant (both, before and after moving), and non-migrant households did not differ in their per capita ownership and cultivation of land. Thus, sub-hypothesis (ii) of hypothesis 12 was accepted. But the variations in per capita amounts of land cultivated differed between migrant households before and after moving, and between migrant households before moving and the non-migrant households. In the destination villages, in-migrant households were more likely to be among the lower 50% of households in land owned and cultivated per capita. Inequity in access to land was greater within than between villages. Within villages, households in-migrant since 1985 had less equitable access to

land than the other households. Thus, hypothesis 17 was rejected. Migration was one of the processes contributing to rural differentiation in access to and use of land.

C15. The independent and joint roles of migration and some structural factors on access to and cultivation of land per capita by households (both in-migrant and non-migrant) in destination villages were examined. The gender, level of schooling, and ethnicity of the head of the household had no independent or joint influence with migration status on the variation in land per capita cultivated by households. Heads of household in positions of leadership within the village did not differ from those not in positions of leadership in their acreage per capita cultivated. While village leaders were more likely to be heads of non-migrant households, leadership and migration status did not affect the land cultivated per capita in the villages. Thus, hypothesis 19 could be accepted as applied to the independent effects of gender, education level, ethnicity and leadership status or their combined effects with migration status on the acreage cultivated or owned per capita. The marital status (single/ widowed/divorced, monogamous, polygamous), the type of family structure (nuclear, extended-lineal, extended other), and the number of adult females in the household also had no significant independent or combined effects with migration status on land per capita cultivated or owned by households. Thus, hypothesis 20 could be accepted. But, the number of adult females had a significant and negative effect on the mean acreage per capita cultivated when controlled for differences in the age of the head of household, proximity to the Serengeti National Park, average distance to the plots cultivated, the use of msaragambo, the diversity of land types on the catena cultivated, and the length of residence in the village. Households with relatively more adult females perhaps operate a more intensive agroecological system as compared to households with fewer adult females.

The average acreage of land per capita cultivated by in-migrant and non-migrant households did not differ by their use or non-use of ox-ploughing; neither did migration status have an additional effect on the mean acreage per capita of land cultivated. Thus, hypothesis 22 could be accepted. The overall population growth and net-migration trends in the villages during 1978-1988 did not affect the amount of cultivation per capita by

households, and migration status of the household had no joint effect with population trends on the acreage cultivated. Thus, hypothesis 23 could be accepted. Only the differences in the use of msaragambo by in-migrant and non-migrant households had a significant joint effect on the acreage per capita cultivated. Hence, hypothesis 21 was rejected. The age of the head of the household also positively affected the land cultivated per capita but the migration status of the head of household had no additional contributing effect on the variations in the acreage cultivated per capita. Thus, hypothesis 19 as applied to differences due to age in the acreage per capita cultivated by households was rejected but the hypothesis was accepted as applied to the joint effects of age of head of household and household migration status on the mean acreage per capita cultivated or owned by households.

C16. Local village governments allocate or have to approve ways land is obtained by households. While land allocation and its cultivation were significantly attuned to the variations in household size, in-migrant households did not fare as well as the non-migrant households. Migration contributed to rural differentiation because village governments were unable to assure an equitable access to land per capita for in-migrant households as compared to non-migrant households. In-migrant households were more likely to be among the households with 50% lowest per capita ownership and cultivation of land than non-migrant households in the villages. The relatively unfavourable access to land per capita of in-migrant households was also aggravated by their unfavourable access to and the use of msaragambo in the household agroecological system. The differences in access to assistance from msaragambo between in-migrant and non-migrant households was most likely because the in-migrant households had not as yet established the social network to get more msaragambo assistance. Nor could they afford to use paid labour to the extent the non-migrant households did.

The village land allocation policies did not discriminate in access to land per capita (and thus cultivation per capita) because of the differences in the gender, education, and ethnicity of the heads of households. Nor did the policies seem to discriminate in access to land according to the marital status, family structure and number of adult females in

households. The allocation process did not favour households with a member in a position of leadership within the villages nor did the general population trend in the village contribute to any significant differences in access to and use of land by households. Differences in the technology used in the agroecological system had no influence on access to and cultivation of land by in-migrant and non-migrant households. Overall, village land allocation practices were fair but not perfectly equitable. The type of measure used in assessing equity in access to land (total as compared to per capita) by households had some effects on the results obtained.

8.2.1 The Theoretical Implications of the Study

This study concludes that rural migration in the Serengeti district involves a change in 'agroecological locus, in addition to the changes in 'spatial locus' and 'social locus' proposed by Zelinsky (1971). Hitherto, studies and definitions of migration have emphasised changes in the location and social interaction systems of migrants (e.g. Mangalam 1968) and the need for migrants to overcome 'spatial distance' which has physical, temporal, and monetary costs (e.g. Lee 1966, Stouffer 1940, 1960), and 'social and psychological distance' (e.g. Bogue 1959, Burford 1962). This study concludes that rural migrants, who usually obtain their livelihood as agriculturalists, also have to overcome an 'agroecological distance' involved in migration. The study views migration as a major consequence of opportunities and constraints faced by people in the rural areas, specifically in the operations and circumstances of their household agroecological systems. The changes in the social, demographic, economic and ecological aspects of rural life are mediated through the household agroecological systems and agrarian structures.

Boserup (1965) and Bilsborrow (1987) provide among the few examples of conceptual models linking changes in population and agriculture, and including both micro and macro level perspectives. But they do not model, at the micro-level, the relationships between land, labour, technology and environment. This study of rural migration in the Serengeti district has treated the issue of changes in agriculture associated with migration more explicitly, and by integrating and modelling the inter-

relationships between the demography, rural ecology and social linkages (access to msaragambo) in the household agroecological system at the micro-level. Indeed, many of the changes in the 'agroecological locus' are the consequence of the changes in the 'spatial locus' and 'social locus', and whose impacts are responded to by migrants through adjustments and adaptations in their 'agroecological locus'. The changes in the three types of loci are interdependent and interactive. For example, a migrant household's ability to re-establish its home and operate its agroecological system in its new location depends in critical ways on its success in coping with the changes in and establishing its new 'social locus', especially as these affect the household access to the assistance of communal labour parties (msaragambo). Failure to have adequate access to msaragambo reduces the acreage per capita cultivated by households. The study has attempted to identify and operationalize the different dimensions of the changes in 'agroecological locus', for example the changes in the agroecological zone, in the diversity of cultivation plots on the local catena, and in the distance to the plots. In addition, the study has also attempted to operationalize and show the changes and significance of the 'social locus' of migrant households and in processes of migration, for example in the ways of acquiring information, support for their application to reside in the destination village, in obtaining land to cultivate, in re-establishment of the home, and in operating the household agroecological system. Extra-household relatives, friends, msaragambo, church and clan members, etc. are parts of the multi-channel and multi-layered social network that form potential sources of support for migrants and their households.

The adoption of a demographic-agroecological systems approach in the operations of the household (at the micro-level) can also be extended to provide a framework to examine the relationship of migration to other societal processes at the meso-level of village communities and/or at the macro-level of a region, and over time. For example, in the past century, trends in population involved both depopulation and growth in the eastern Lake Victoria region of norther Tanzania. The demographic responses to the impacts of diseases, colonial government policies, etc. or to the effects of the medical advances, 'villagization', rural development, etc., were mediated through changes in the

household agroecological systems, and were expressed consequently, in the regional pattern of changes in population and land use. Natural increase, migration and processes of agricultural extensification and intensification interactively operate with varying consequences in different parts of the eastern lake region over time. The study avoids the implicit linear outlook of the modernization-mobility transitions theory (Zelinsky 1971, 1979) and instead draws from the multi-phasic demographic response (Davis 1963) and agricultural intensification (Boserup 1965) theories to examine changes in demography, agroecology and society.

The demographic-agroecological perspective also recognizes that non-economic factors were the primary cause of the trends in the processes of population redistribution in the Serengeti district and eastern Lake region. This contrasts with the general equilibrium or historical-structuralist (Woods 1982) perspectives of the causes and consequences of migration that have focused on the economic/production relationships in various societies over time. Such perspectives have not incorporated the ecological dimension. There are patterns and regularities in the movement of people in the eastern Lake Victoria region in the past century but they are not only, nor even primarily due to economic transformations and modernization as suggested by Zelinsky's model (1971, 1979). Instead, epidemiological transitions have accompanied mobility transitions in the region, especially during the periods of agroecological collapse and recovery. Similarly, the impacts of 'villagization' were associated with a national policy intended to improve access to social services and rural life as much as distinct from bringing about economic development through the growth of agriculture and cash economy. This study thus suggests that changes in population growth rates and mobility transitions have occurred in pre-industrial societies, that the transitions from high birth and death to low birth and death situations and industrial/economic development are sufficient, but not necessary, conditions for mobility transitions.

Operational models of migration in developing countries tend to emphasise 'pull factors' and stress the role of economic activity in the modern sector as a determinant of migration (Brown and Sanders 1981). Although a study of the reasons for moving stated by migrants does not constitute an analysis of their motives for relocating (Pryor

1975), and responses given are prone to post-hoc rationalization (Kosiński and Prothero 1975), such stated reasons form the simplest and most direct statement of the causes of migration by those involved in moving (De Jong and Fawcett 1981). In Serengeti district, the failure of households to fulfill their survival needs in places of residence, rather than self-evaluations of their relative deprivation (Stark 1984) in the community, or of expected income in other locations (Sjaastad 1962, Todaro 1976) dominated the household calculation and choice of migration as an option. Assessments of non-economic personal and household utilities had more to do with movements of people than calculations of place utilities. The results concur with Brown and Sanders (1981:160) that 'push factors' were more important than 'pull factors' in Third World migration. But, in the case of Serengeti district, this was true for both the household reasons stated for migration and the complex of factors, for example the needs for land, security, family reunification, etc., that would shape the likelihood of movements. Since morbidity and mortality are significant causes of the incidence and rates of population movement (Prothero 1965, 1993), their role warrant inclusion in operational models of migration in developing countries. The value-expectancy approach (De Jong and Fawcett 1981) and appreciation of the social-psychological underpinnings (Haberkorn 1981) of rural migrations appear to offer greater potential for modelling the reality of rural population movements in areas like Serengeti district.

A considerable amount of the literature on rural-urban and rural-based migration has stressed that land ownership has significant effects in reducing the incidence of migration (see Connell et al. 1976 for a review). In Serengeti district and in Tanzania in general, access to land is assured for rural people through the Ujamaa Villages Act (1975) and this contrasts with the situation of high levels of landlessness and lack of land ownership in many parts of Asia and South America (Conway and Shrestha 1981, Abeysekera 1984, Barlett 1982). But, access to rural land and the pattern of its use in Serengeti district were not associated with formalised land ownership, for example in the possession of title deeds, nor with any market mechanism involving land. Instead, land is communally owned and allocated by the village local government to households. The migrant households of Serengeti district did not ascribe their movement to a lack of land

ownership, or to inequalities in access to and use of land, or to a perception of being relatively deprived in access to land when compared to the majority of other households in their villages of origin. However, there was a significant perception of relative deprivation in terms of soil fertility of the land owned and used. The situation in Serengeti district and much of rural Tanzania suggests that migration theory needs to recognize more explicitly the differences in concepts of ownership as it applies to different agrarian systems and cultures, and accordingly operationalize these differences in models of migration.

The emphasis on economic dimensions is partly the consequence of an implicit 'urban bias' (Lipton 1977) in the prevailing development paradigms; Balan (1983:152) also noted a 'bias' towards modernization and adaptation to urban life in migration literature. These paradigms, for example modernization and general equilibrium economic theory, inform most operational models applied to the analyses of population movements in the rural areas of developing countries. The mis-application of rural-urban migration models (both explicit and implied types) to rural-rural situations also arises from the availability of few conceptual models (Brown and Sanders 1981) appropriate to the specific conditions of migration within the rural areas of the developing world and consonant with the particular contextual level of development within which the population movements under study are undertaken. Mahadevan et al. (1993) outline a holistic model of Third World development which stresses improvements in the quality of life as opposed to only economic and income changes. Their general systems model provides a paradigm with potential to generate migration models that are specific to the conditions in rural areas of developing countries and attuned to the issues of basic needs, social networks, equity, and rural ecology in addition to economic changes. More middle range theories of migration specific to the rural areas of the developing world are needed and the modelling of the interrelation between migration and household agroecological system in the Serengeti district is a contribution to the attempts towards construction of appropriate typologies and theory (Nurun Nabi and Krishnan 1993).

Migration in the Serengeti district is a process rather than an event or outcome of a decision. The study has indicated that rural migration is a dynamically complex process

with both forward and backward linkages between various situations, sub-processes and events (e.g. dissatisfaction with the place of residence, decision to move, relocation, etc.) that are conventionally approached as discrete components in migration analysis. For example, households involved in re-establishing their agriculture were simultaneously altering their 'social locus' in the places of destination and origin, which in turn, had interactive effects on the processes involved in re-establishing the home and household agroecological system in the place of destination. Theoretically, this complexity and interdependency involved in the process of moving from one place to another suggests that various conceptual and operational models of migration need to become more cognizant of the additive and even multiplicative effects arising from the interactions of the different sub-processes involved in migration. These effects in turn influence the relative significance of the individual, household and community level factors influencing and determining the propensities to migrate and to stay, and their consequences. As Brown and Sander's (1981:149) conclude, there is more disagreement among migration researchers about the relative importance of, rather than the types, of factors that are relevant to migration in developing countries.

In migration studies, the area of origin of migrants to a particular location can be functionally defined as an 'in-migration field', and nodal area of the destinations of migrants from a particular place is designated as an 'out-migration field' (Cadwallader 1992). The lifetime movements of the inhabitants of Serengeti district are mainly intra-district and intra-regional. This result agrees with Claeson and Egero's (1973) contention about migration in Tanzania. The presence of three clan/ethnic migration fields in the Serengeti district indicated that such fields should incorporate a cultural dimension that shaped the spatially defined 'migration field'. Such fields are examples of units in which migrants accomplished simultaneous changes in their 'spatial' and 'social' loci (Zelinsky 1971). The Eastern Lake Victoria Population Region forms a more appropriate functional 'migration field' to examine the population movements of the residents of Serengeti district. Its definition is inclusive of the spatial, temporal, demographic, cultural and agroecological dimensions of population movements among the peoples of Serengeti district.

While some (26.3%) of the migrant households in the Serengeti district obtained information about alternative destinations from relatives and friends, they did not heavily rely upon them for information as has been suggested by Ritchey (1976:392) and Goodman (1981:137) for migrants in developing countries. Instead, personal experience of the conditions in the migration destination was much more important as a source of information for migrant households in the Serengeti district. About 67.1% of the households that moved (includes return migrants) had previously visited or resided in the destination village. Migrant households relied more on relatives, friends and other members of the community in the destination village for assistance after arrival.

Although one's own experience was the best source of information about other places to live in, the needed information could be effectively obtained for only a few potential destinations. Consequently, less than a tenth of migrant households in Serengeti district considered more than one location to move to. Overall, Goodman's (1981:137) conclusion that "the migrant typically considers very few, if any, alternative destinations before moving" was true for households that moved in Serengeti district. It may be equally valid for international migrants: Lin-Yuan (1993:142) found that 78.1% of Chinese immigrants into Edmonton (Canada) considered 2 or less countries as their potential migration destinations. Most migrants in Serengeti district moved for several reasons, as has been suggested by Kosiński and Prothero (1975) to be the case for most population movements. Most people in Serengeti district have moved several times as has been observed by (Zelinsky 1971), and lifetime mobility was higher among those between their late teens and mid-thirties, and lower in younger and older ages as noted by Bogue (1969) among people who move. The volume of movement among migrants in Serengeti district was inversely related to the distance moved and this result was in agreement with Ravenstein (1885, 1889) and Zipf (1946); and, the movements were usually carried out by households, as is the case noted by Ominde (1975) with much of rural migration in East Africa. The generally short-distance nature of movements in the Serengeti district facilitated, as well as were the consequence of, the process of obtaining some personal experience of the migration destination. Such experience was helpful in (a) assessing the social, economic, agroecological and environmental situation in a potential place of

residence; (b) in mobilizing the support of relatives, friends and others as future sources of assistance in establishing the home (e.g building, temporary board) and livelihood (e.g clearing land, cultivating, access to farm tools, oxen, and labour); and, (c) in planning the actual mechanics of the household's relocation. Perhaps equally critical is the ability of a migrant to lobby and present an application to reside in the destination village. A testimonial from the the government of the village of origin, and the presence of relatives, friends and others in the village of intended destination who could vouch for the good character of the potential migrants were important in securing residency in a destination village. The ability to purchase a homestead improved the chances of being accepted as an in-migrant and made access to land easier, especially if the vendor of the homestead was moving out of a village in which land was scarce.

Following a decision to move the household, the process of its relocation was aimed at overcoming the distance between the villages of origin and destination as an intervening obstacle (Lee 1966) rather than as a source of intervening opportunities (Stouffer 1940, 1960). Thus, the movement was carried out quickly, partly facilitated by the short distances moved by households. The poor availability and high costs of transportation compelled most households to walk to their destinations and carry only the most needed of their belongings. Movements were destination-oriented, largely because intervening opportunities such as jobs or land are not easily available. In a situation when land, even where in great supply, can be obtained only contingent on the approval of the local village government, a household intending to migrate is required to arrange the permission to reside in the destination village prior to moving into it. This contingency has in turn made the role of prior and personal experience of the potential destination a crucial feature of rural migration in Serengeti district. Visits to a potential destination facilitate the processes of lobbying and presenting an application to reside in the village, mobilize the support of relatives, friends and others to favour the application and secure the assistance needed after relocating in the village to re-establish the household and its agroecological system.

The study of the impacts of migrations in developing countries has focused on individuals (Simmons et al. 1977, Goldstein and Goldstein 1981) but little is known about

its effects on the household and the community (Nurun Nabi and Krishnan 1993). In Serengeti district, three categories of impacts and associated processes integral to the movement and assimilation of the migrant into the host-community could be identified. The first category of impacts involved relatively short-term disruptions in normal household dynamics and were associated with the processes of relocation to, the re-establishment of the homestead, and acquisition of cropland in the destination village. The second category of impacts were more long-term adjustments and adaptations that had important consequences for the livelihood of the household and its future demography, including the likelihood of migrating again. Among its main associated processes were the responses to changes in the agroecology and in the social networks essential to the survival and well-being of the household. The household responses to the changes and impacts associated with migration are also mediated through their agroecological system. The third category of impacts were both short and long term, and on the community level. In the short term, the impacts of migration affected the likelihood of other in-migrants being accepted where land was scarce and in-migration regulated; in the long run migration impacts shaped the overall context of village demographic and development trends. Among their associated processes were the roles of migration in rural differentiation and innovation. The community level impacts of migration in the Serengeti district were mediated through the role of village local governments in allocating land to households, and equity in access to land. These impacts are discussed in the section on the public policy implications of the study.

8.2.2 Methodological Implications of the Study

There are three main methodological implications of this study. First, the adoption of an agroecological approach to examine the patterns, causes, processes and impacts of migration provided an operational definition of migration in the rural context of Serengeti district. A major problem of definition is one of distinguishing between migration and other forms of mobility, for example circulation, in African population movements (Kosiński and Prothero 1975, Prothero and Chapman 1984). In this study, persons and households were defined as in-migrants if they obtained permission to reside in a village,

moved to it and undertook agricultural activities; out-migrants were defined as those who moved out from the village and did not cultivate/crop their land for an agricultural season. Either of these criteria defined migrants. Even those with employment or incomes from trades (e.g. teachers, carpenters) undertake crop cultivation in their villages of residence; non-cultivators also need approval for residency. The approach adopted to define migration appears to be appropriate for other rural areas of the world.

The second methodological issue is the adoption of the household as the conceptual and analytical unit. It forms the unit of social relations, production, consumption and reproduction. In addition, the impacts of demographic, socio-economic, political and agroecological processes impinge on the household, and individual responses to these impacts are mediated through the dynamics of the household. The household is also the unit in which population pressures are felt long before such pressures become apparent at the village or any other macro-level. The household forms the operational linkage between people as individuals and the village community. Thus, the household forms a useful conceptual and operational unit (Harbison 1981) for developing migration theory and models appropriate to the rural situations.

The third methodological implication arises from the effects of variations in household size as a factor in assessing rural equity, specifically access to land and its use. The study demonstrates the significance of and differences in the types and relative significance of the determinants of the acreage owned and cultivated, depending on the use of per capita as compared to household level measures of the ownership and cultivation of land. The study also shows that an analysis of variation, rather than the average, is often conceptually more meaningful in understanding the rural reality. The use of multivariate analysis also complements bivariate level analysis and helps to explore and explain some of the more complex features and role of various factors in the processes of rural population and agroecological dynamics. In turn, the different approaches and their derived results have important implications for public policy. The results of this study concur with McDevitt et al. (1986) and Findley (1987) that variable selection and variable measurement are among the important methodological considerations to the quality of migration studies.

8.2.3 Public Policy Implications of the Study

How governments can channel migration to advance conscious policies, for example in promoting social and economic change, and egalitarian development, is an important challenge (Morrison 1983); Simmons (1993:357) also has stressed the need "to link migration outcomes to particular policy mixes". The most important public policy result of this study is the recognition of the critical role that village local governments have in the migration process in the rural areas of Serengeti district. This role is mainly the indirect consequence of such governments having been empowered to allocate land to village residents. It is a feature possibly unique to the specific conditions of the 'villagization' and rural policy in Tanzania. Local village governments in Serengeti district have emerged as executors of population redistribution policies which the national government is as yet grappling to shape and implement. Village governments can regulate the rate of in-migration according to their assessment of the resource-land situation in their village. Where land is scarce, the acceptance of in-migrants is linked to the incidence of out-migration by households and the availability of land to allocate to in-migrants. Five different types of policies (Table 6.13) towards migration could be identified in the Serengeti district.

The analysis of the household and community level impacts of migration in Serengeti district suggests that village local governments assure fair, if not perfectly equitable, access to land by the members of the village community. The size of the household was an important criterion influencing the amount of land allocated to a household, and age of the head of the household had additional contributing effects. Even in situations of land scarcity and strict regulation of in-migration, households accepted for residency by local village governments obtained land (per capita) without being discriminated in terms of the gender, level of schooling, and ethnicity of the head of households. Neither did a lack of a position of leadership within the village have any discriminating effect. While clan territoriality was prominent in some areas and many movements took place in clan based 'migration fields' that excluded other ethnic groups, the average amount of land per capita cultivated by different ethnic groups in the Serengeti district did not differ significantly. The spatial differentiation in the pattern of settlement based on ethnicity did

not lead to inequity in access to land per capita among households of different ethnic affiliations.

But, migrant households were worse off in their relative access to and cultivation of land per capita within their destination villages. More than expected numbers of migrant households were in the lower quartiles of land ownership and acreage cultivated per capita than households that had not moved. The most important differences in the access to and cultivation of land per capita were between households that were resident in the village prior to 'villagization' (1973-1974) and households that moved into the villages after the outbreak of socio-political strife in the Serengeti district since 1985. The village local governments could not allocate land as equitably to in-migrants after 1985 as during the period between 1973-1984 when ethnic rivalries, banditry and insecurity were not significant causes and context of migration. Migration needs to be assessed in the local context of its particular socio-political settings and its impacts are also mediated through these settings.

A number of public policy measures are required in the Serengeti district that are of critical significance to assure equity and socio-political stability when many differentiating and potentially divisive factors have emerged. Village local governments need to be made aware about their success in land allocation and be urged to undertake a serious dialogue to resolve the problems of banditry, rustling, and ethnic differences. This is a matter of great urgency because the disruptive effects of the socio-political strife on migration patterns and processes have undermined a more equitable allocation of land to migrant households and revived the importance of some exclusive 'migration fields'. While no external legislative or district government initiative is proposed, this study recommends that village governments be apprised about the emergent inequity in access to and cultivation of land per capita by in-migrant households as compared to non-migrant households. There is a need to persuade the local village governments to increase allocations of land to in-migrant households. In addition, this allocation should include a diversity of land types on the local catena and be within reasonable vicinity of the homesteads so that households do not forfeit time and effort spent in walking to and from their plots of land.

Wildlife conservation is now the second most important land use (nationally and regionally) after small-scale farming and livestock husbandry. The game sanctuaries of the Serengeti area prohibit all agricultural activity and have become a barrier to people that would have otherwise occupied, as before the 1950's, areas now within their borders. Agriculture has taken over much of the Ikorongo Game Controlled Area and the demand for additional land also has become a source of increasing pressures on the northwestern border of the Serengeti National Park. Further south, settlement development has repeatedly breached the boundaries of the Maswa Game Reserve and led to reduction of its size. A major effect of the creation of the wildlife sanctuaries has been to interrupt, divert, and eliminate the earlier patterns of social, economic and demographic interaction. But, there has been little, if any, compensation to the local population for these disruptions. The benefits of tourism are yet to be effectively integrated with the local rural economy although agriculturalists around the sanctuaries continue to bear the full costs of the loss of crops, livestock and human life caused by wildlife.

In villages with land shortages which are usually in the hills/highlands and adjacent to the boundaries of the Serengeti National Park (especially Machochwe, Nyamakendo, Koreri, Nyamburi), access to land has become an urgent public policy issue with important consequences for wildlife conservation. This study recommends that Tanzania National Parks urgently initiate a sustained effort to promote development in such villages. Specific support should be targeted to rehabilitate the dams and livestock dips, help improve the traditional water supplies by funding the digging of wells and lining (with concrete) existing wells, support the community effort to build a school and provide secondary education at Matare, and construct a bridge over the Nyamburi river to provide all weather access to Mugumu town from Nyamburi. In addition, both Tanzania National Parks and Serengeti Wildlife Research Centre should assist the district authorities and jointly promote measures to protect communities from the damage and destruction caused by resident vermin (e.g. baboons, wild pigs, mongooses, monkeys), and demonstrate to villagers in the district techniques of 'early burning' to protect grasslands and promote woodland regeneration. Authorities concerned with wildlife

conservation must abandon policies of neglect or confrontation with the peoples living around the wildlife sanctuaries, and instead accomodate and promote their needs of survival and development.

8.3 Limitations of the Study

The study has four important limitations. First, it did not cover the households and villages in the three wards (Ringwani, Kisaka and Kenyamonta) in the northwestern portion of the Serengeti district. Funds available to pay for car fuel and the salaries of the research assistants were very limited. However, the omission was not seen as conceptually delimiting because the research design used included other wards with similar upland plateau conditions and net migration trends. However, a study of the area would be useful for understanding the local agroecological systems and the potential for developing irrigation agriculture by drawing water from the Mara river.

The second obvious limitation of the study was the failure to conduct village and household surveys in the places of origin of the in-migrants into Serengeti district. The context of out-migration and the agroecological features of households that did not move are little understood. This failure was due to two main problems. First, there were no data to establish, without undertaking a preliminary survey, the specific villages from which the in-migrant households originated. Secondly, the historical source areas of in-migrants to the Serengeti district have been numerous, from villages and towns within the district, several adjacent and distant districts in the eastern Lake Victoria region, from other parts of Tanzania, and from neighbouring countries like Kenya. A research design that included comparisons between the migrant households with the other households in their places of origin would have been more complete and conceptually complementary to this study that has emphasised the demography and agroecology of 'migrant' households (before and after moving) and 'non-migrant' households in the destination villages.

The third main limitation of this study was the cross-sectional analysis of the processes and impacts of migration. A longitudinal study would have helped to understand the variations in the type and strength of migration processes, and their

interlinkages with other demographic processes, over time. This is particularly significant in the context of the changes postulated to take place in the patterns and processes of migration and mobility as a consequence, and contributing cause, of trends in development (Zelinsky 1971, Brown and Sanders 1981). Secondly, a longitudinal study would have allowed the monitoring of potential migrants as they formed the intent and the decision to move, the relocation, re-establishment and adjustments in the place of destination. Finally, a longitudinal study would made it more feasible to include people who had moved into the villages and moved out (or died) before the single round survey was conducted.

The fourth major limitation of the study is the relatively small sample sizes of the migrant and non-migrant households surveyed. Again, the limits of available financial, transport and research resources considerably restricted the field study. However, the sample of households surveyed included persons whose movements were representative of the main types and causes of migration in the Serengeti district. These included spontaneous internal migrants, return migrants, immigrants from Kenya, etc., and those who moved because of 'villagization', etc. In addition, the age-sex composition of the households surveyed in the district was similar to that of the overall district population enumerated in 1988. There was little reason to believe that the sample was biased but it is likely that a larger sample size may have contributed to some additional confidence in some of the results.

8.4 Some Recommendations on Future Research in Migration, Rural Development and Ecological Conservation in the Serengeti Area

The study of the processes of rural-rural migration in other areas of the eastern Lake Victoria region is required, especially in the context of the interrelation between rural migration and agricultural development. This is especially relevant in areas like the Ukara island and Tarime highlands that have supported high population densities, have made agricultural advances based on ethnoscience, have contrasting climates and cultures, and have been areas of sustained out-migration over the past half century. The linkages between rural based and rural-urban movements also need to be examined and integrated

in a comprehensive investigation of migration.

The second area of recommended future research is an analysis of the types and degree of agricultural intensification among households that migrated as compared to those that did not move. Among the important issues are the similarities and differences in the use of inter-cropping, crop rotation, the intensity of weeding of crops of various types, etc., as additional dimensions of the changes in 'agroecological locus' associated with migration. While data for such an analysis were gathered during the course of the present study, the results could not be included because of their detail and wide scope. It is suggested that future work of this type be carried out within a farming systems framework. The research should consider the decision-making processes and strategies, at the micro, meso and macro levels, that underlie the patterns of agroecological changes associated with population growth and redistribution. Longitudinal studies are also needed to understand the inter-relationships between demographic, social, economic, agroecological and environmental processes and their long-term outcomes, whether Malthusian, Geertzian, Boserupian, etc. A third area of recommended research is in ways that village local governments affect the processes of rural migration in the areas adjacent to the Serengeti district and around the wildlife sanctuaries of the eastern lake region. How local governments resolve scarcities of land and influence in-migration into villages near the boundaries of the wildlife sanctuaries has important implications for both rural development and ecological conservation in the Serengeti area. More specifically, research is needed in assessing the processes of granting residency rights and allocating land to people and especially to in-migrants. Much more effort is required on compensating local people for the losses caused by wildlife, especially local agricultural vermin. This type of applied research and informed public policy would contribute towards rural equity and social justice, as well as enhance the conservation of the Serengeti. The critical role and impacts of village local governments on population redistribution need to be recognized and integrated into the formulation of national level policies on population, development and ecological conservation in Tanzania.

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Appendix I

Population Growth and Net Migration: Serengeti District, 1978-88

Village/WARD	1978 Pop Size	1988 Pop Size	1978-88 Growth	1978-88 NMGR
Merenga	-	1175	-	-
Machochwe	5058	1373	-12.2	-10.5
Nyamakendo	-	1718	-	-
Mbalimbali	2364	1950	- 1.9	- 4.9
Koreri	1417	1779	2.3	- 0.6
Nyamburi	1137	3220	11.0	15.1
Kisangura	2711	3693	3.1	0.4
Nyamoko	1103	1517	3.2	0.6
Ngarawani	2486	2818	1.3	- 1.9
Itununu	1952	2601	2.9	0.1
Msati	2525	1593	- 4.5	- 6.9
Kebanchebanche	1724	2583	4.1	1.8
Nyansurura	2746	840	-11.2	-10.1
Rungabore	5158	2730	- 6.2	- 7.9
Gesarya	-	1447	-	-
Matare	2132	2503	1.6	- 1.4
MUGUMU RURAL	35057	37048	0.6	- 2.6
MUGUMU URBAN	4042	6758	5.3	3.5
Kebosongo	1033	2813	10.5	14.1
Rwomchanga	1281	2213	5.6	4.1
Robanda	845	1369	4.9	3.0
Miseke	337	1437	15.6	29.5
Bwitengi	1120	2063	6.3	5.2
IKOMA	4616	9895	7.9	8.3
Burunga	1664	1454	- 1.3	- 4.4
Nyichoka	940	1612	5.5	4.0
Mbiso	954	1862	6.9	6.3
Motukeri	2025	1906	- 0.6	- 3.8

Iharara	1641	1614	- 0.2	- 3.4
Makundusi	730	1069	3.9	1.5
Nyakitono	-	545	-	-
NATTA	6313	8448	3.0	0.2
Nyamsingisi	1128	1192	0.6	- 2.6
Nyaberekera	2564	2946	1.4	- 1.7
Kitembele	2195	2183	- 0.1	- 3.2
Rigicha	1807	1415	- 2.4	- 5.4
Singisi	1851	1361	- 3.0	- 5.8
Nyankomogo	-	1197	-	-
ISSENYE	11186	11908	0.6	- 2.5
Borenga	1858	2195	1.7	- 1.4
Nyiboko	1837	1934	0.5	- 2.7
Buchanchari	1776	2398	3.0	0.3
Nyansurumunti	950	980	0.3	- 2.9
Gantamome	1528	2007	2.8	0.0
KISAKA	7449	9514	1.8	- 0.4
Gusuhi	1622	2247	3.3	0.7
Busawe	1421	970	- 3.7	- 6.4
Majimoto	2113	3219	4.3	2.1
Nyagasense	3415	3274	- 0.4	- 3.6
Remugorori	1561	1615	0.3	- 2.8
Kenyamonta	1431	1571	0.9	- 2.2
Iseresere	-	953	-	-
Mesaga	-	2098	-	-
KENYAMONTA	11563	15947	3.3	0.6
Maburi	1943	2762	3.6	1.0
Masinki	2064	2705	2.7	- 0.1
Kenyana	1698	1504	- 1.2	- 4.3
Kemegesi	3572	2793	- 2.4	- 5.4
Mosongo	-	557	-	-
Ringwani	-	822	-	-
Nyamatoke	-	953	-	-
Ringwani	9227	12096	2.7	- 0.1

DISTRICT	90003	111614	2.2	- 0.8
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Source: Calculated from Village Populations Data, 1978 and 1988

Note: 1978-88 Growth Rate in percent per annum

1978-1988 Net Migration Growth Rate (NMGR) in percent per yr.

NMGR calculated as in Bogue et al. 1982

Pop=population

- value could not be calculated; new village formed after 1978

Appendix IIa

RURAL-RURAL MIGRATION IN THE SERENGETI DISTRICT: VILLAGE QUESTIONNAIRE

INSTRUCTIONS TO THE INTERVIEWER

- 1) This questionnaire is to be answered either by a village chairman, secretary, and/or other member(s) of the village council.
- 2) The answers are to be recorded, where appropriate, by putting ticks, circling the response among indicated choices, or/and making clear, short notes.
- 3) Write the answers clearly and neatly in the spaces provided.
- 4) Additional comments may be noted on the back of the page. Make sure that the question number is noted beside the answer.
- 5) Explain the aim and purpose of the study to the respondent(s). Assure him/her/them the confidentiality of the answers.
- 6) Do not prompt any answers but note accurately the responses. Do not discuss any respondent's answers with anyone.
- 7) Always be polite and patient. Thank the respondent(s) for his/her/their cooperation, valuable time and hospitality.
- 8) Keep the questionnaire in a safe and secure place to avoid its loss, or damage to it.
- 9) Note below if the questionnaire is completed or if a return interview session is necessary. Arrange for the time of the return session.

Interview Completed ? Yes No

Return Session Needed ? if Yes, Day _____

Date _____

Place _____

**RURAL-RURAL MIGRATION IN SERENGETI DISTRICT
VILLAGE QUESTIONNAIRE**

Name of Village: _____ Ward: _____

Respondent(s): _____ Date: _____

Is the Village Registered ? Yes No Applied Intended

When was the village established ? Year: _____ Not Known

Is/was the village known by any other name ? _____

Does the village name have a meaning ? _____

Village Grid Co-ordinates: _____
(Lat./Long.) UTM (1:250,000 map)

A) VILLAGE POPULATION AND MIGRATION

1) No. of People: _____ (2) No. of Households: _____

3) No. of Household Cells: _____ (4) No. of Cell Leaders: _____

5) No. of Male Cell Leaders: _____ No. of Female Cell Leaders: _____

6) Village Population: Adults Children

Males _____ _____

Females _____ _____

7) Population in 1988 ? Males _____ Females _____

8) Is there a village population register ? YES NO

Intended Not Interested

9) Since the last wet season,

No. of Families Moved into the village ? ____ Don't Know

No. of Persons have moved into the village ? ____ Don't Know

Names of Villages and Wards that these people came from:

Villages: _____ Wards: _____

Why did they come to live in this village ?

10) Since the last wet season,

No. of Families that moved out of the village ? ____ Don't Know

No. of Persons that moved out of the village ? ____ Don't Know

Names of villages and wards these people moved to:

Villages: _____ Wards: _____

Why did they leave this village ?

B) VILLAGE ECONOMY AND ECONOMIC ACTIVITIES

11) What types of economic activities are carried out in the village ?
(tick or circle the choices)

(i) food crops (ii) cash crops (iii) livestock (iv) fishing (v) gathering honey

(vi) milling (vii) making ghee (viii) forestry (ix) charcoal making (x) ranching

(xi) brewing (xii) bee keeping (xiii) shopkeeping (xiv) pottery (xv) weaving
(xvi) mat making (xvii) quarrying (xviii) mining (xix) selling firewood
(xx) carpentry (xxi) brick making (xxii) other: _____

12) How many persons in the village have wage employment ?

administration: _____ health service: _____ education: _____ estates: _____
ranching: _____ milling: _____ bars: _____ shops: _____ drivers: _____
mechanics/repairs: _____ road works: _____ Building: _____ quarrying: _____
butcheres: _____ Other: _____

13) Number of villagers working elsewhere ?

In other villages: _____ In other towns: _____ In other countries: _____

Don't Know

Note (below) the names of places, types of occupations and dates since villagers have been employed elsewhere.

14) How many of the following enterprises are there in the village ?

private shops: _____ cooperative shops: _____ garages: _____ tailor shops: _____
shoemakers: _____ bicycle repairs: _____ bars/restuarants: _____ pombe shops: _____
grain mills: _____ butcheres: _____ bakeries: _____ foundaries: _____
OTHER: _____

15) How often is (i) a village market held each week ? _____

(ii) a livestock market held each week ? _____

16) What types of crops are bought and sold in the village ? (circle choices)

cotton maize rice sorghum millet sesame cassava beans

bananas peas peanuts sunflower sisal other: _____

What types of crops are bought and sold by:

Individuals/ families: _____

Private entrepreneurs: _____

Village Cooperative Store: _____

Govt/Parastatal Agency: _____

Other: _____

17) Are the following farm implements and inputs available ?

(tick the responses and code in the appropriate boxes)

Source codes: 1) private shops 2) market vendors 3) coop 4) govt agency 5) church
6) other (name)

Affordability codes: YES NO (e.g. very expensive, cheap)

	always	sometimes	never	source	affordable ?
hoes					
pangas					
spades					
axes					
ox-ploughs					
plough spares					
tractor hire					

18) Are the following farm inputs and services available ?

	always	sometimes	never	source	affordable ?
regular seeds					
hybrid seeds					
fertilizers					
insecticides					
transportation					
extension work					
veterinary					
tree seedlings					

19) How would you rate the availability of the following agricultural items and services in the village over time ?

	last year	3 yrs ago	5 yrs ago	Can't say
farm tools				
hybrid seeds				
fertilizers				
insecticides				
transport				
storage				
marketing				
extension				
veterinary				
seedlings				

Temporal Codes: better, same, worse, can't say/ other comment

20) If the above agricultural inputs and services are not available in the village, where and from whom are they obtained ?

input/service place(s) source agency affordable ?

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

C) VILLAGE LOCATION AND COMMUNICATION

21) What is the distance (km) to the nearest:

(i) paved road _____ (ii) all-weather road _____ (iii) dry season road _____
 (iv) river _____ (v) stream _____ (vi) park/reserve _____ (vii) village _____
 (viii) town _____ (ix) District HQ _____ Regional HQ _____

22) Are there bus services through the village ? (circle answer)

YES NO If Yes, where to ? _____

REGULAR OCCASIONAL How often in a day/week ? _____

COSTS: Affordable Unaffordable

23) Do villagers have the following means of transportation ?
 (if yes, tick answer in the box)

	cart	lorry	bus	cars	tractor
privately owned					
cooperative owned					
government owned					
church, etc. owned					

D) VILLAGE SOCIAL INFRASTRUCTURE AND ADMINISTRATION

24) What are the health facilities available to villagers ?

TYPE: MCH clinic Dispensary Mission Hospital Govt. Hospital

Location (name): _____ Distance (km): ____ Walking time: _____ (min/hrs)

Names of villages that share the health facility: _____

25) Where is the nearest govt./mission hospital ? _____

Distance (km): _____ Walking Time: _____ (min/hrs)

26) Do villagers have access to mobile health or flying doctor service ?

YES NO If Yes, how often ? weekly monthly 3 monthly

6 monthly yearly on emergency

27) What are the education services available to the villagers ?

TYPE: kindergarten primary secondary vocational religious

Nearest Primary school: Location _____ Walking Time _____ (min/hrs)

Names of villages sharing the school: _____

No. of Classes: ____ No. of Pupils: ____ No. of Teachers: _____

No. of Boarding Students: ____ Where do they come from ?

28) What kinds of educational facilities are needed by the villagers ? (note below)

29) What are the sources of water for human use in the village ?

pools shallow well deep well spring stream river dam lake pipeline

30) What is the quality of water ? very good good fair bad

What are the problems of water quality ? _____

31) Is the quantity of water available to villagers in the wet and dry seasons:
(tick in appropriate box)

	wet season	dry season
plentiful		
more than enough		
just enough		
not enough		
very inadequate		

32) Where and how far is the nearest source of drinking water ?

Location: _____ Source: _____ Walkin Time: _____

Wet Season Quality: _____ Dry Season Quality: _____

Shared with other villages ? NO YES Villages: _____

33) What are the sources of water for livestock in the village ?

pools spring stream river dam well pipeline lake

34) Is the availability of water adequate ?

In wet season: YES NO In dry season: YES NO

Is it shared with other villages ? YES NO

35) Where is the nearest permanent source of water for livestock?

Location: _____ Source: _____ Walking Time: _____

Is there enough water for livestock dipping ? YES NO

36) Is there any potential for or irrigation practised in the village ? When ?
(circle answer)

irrigation practised: YES NO dry season wet season

irrigation potential: YES NO dry season wet season

37) Has a government or any other agency investigated the problem of water supply in the village ?

YES NO Yes but nothing done yet Intended

38) What types of personnel and administrative structures does the village have ?

council chairman secretary treasurer health officer livestock officer game officer

forestry officer police magistrate extension officer nurse RMA teachers

dip village office crop store village shamba development committee

other: _____

E) VILLAGE RESOURCES AND RESOURCE USE

39) The sources of firewood are: (circle choices)

(i) forest woodland bush thicket woodlot crop residues

(ii) within village boundaries outside village boundaries

(iii) bought gathered shared with other villages _____

(iv) communally owned individually owned forest reserve park

Distance to nearest source of firewood is _____(km) _____(hrs)

40) How would you rate the availability of firewood currently and over time ?
(circle responses)

(i) plentiful easily available just enough scarce very scarce

(ii) increasing no changes decreasing can't tell

41) Are there any woodlots ? NO YES PLANNED FAILED

42) Describe the availability of wood for building purposes:

(i) plentiful easily available just enough scarce very scarce

(ii) within village neighbouring village town bought gathered

43) The grazing resources are: (circle choices)

(i) within village outside village forest reserve game reserve

(ii) unfenced communal plots unfenced individual plots

(iii) fenced communal fields fenced individual fields

(iv) plentiful adequate just enough scarce very scarce

(v) increasing no change declining can't tell

(vi) in hills on ridgetops on slopes in vallets/mbugas

(vii) shared with other villages also used by wildlife

(viii) seasonally burnt seasonally flooded eroded

(ix) tick infested tsetse infested other: _____

44) How are the rainfall conditions for crop production in the village ?
(circle responses)

(i) floods more than adequate adequate less than adequate drought

(ii) increasing since last census has been steady variable

decreasing since last census can't tell

45) What are the characteristics of the village soils ?

(i) very fertile fertile not fertile exhausted

(ii) stony shallow deep crackup waterlog salinizing

(iii) no erosion wind eroded water eroded stock eroded

(iv) increasing fertility no change declining fertility

Names of village soils are: _____

F) LAND AVAILABILITY AND LAND USE

46) How do people obtain land for agricultural activities ?

(a) In the village: (i) clear/occupy (ii) inherit (iii) buy (iv) exchange

(v) through village govt (vi) through marriage (vii) other _____

(b) Outside village: (i) clear/occupy (ii) inherit (iii) buy (iv) exchange

(v) through ward govt (vi) through marriage (vii) other _____

47) Are there any village/community regulations about acquiring land ?

YES NO VILLAGE/GOVERNMENT LAW TRADITIONAL LAW

Is permission needed from village government to:

	clear/occupy	buy	sell	exchange	share	inherit
YES						
NO						

Does one need to register/inform about land obtained ? yes no

Comments: _____

48) Are there any village/community rules about the use of land ?
(put ticks to indicate yes or comments in appropriate place)

	YES	NO	GOVT. LAW	TRADITIONAL LAW
growing food crops				
growing cash crops				
grazing livestock				
using forests/wood				
controlling erosion				
controlling pests				
controlling fires				
controlling disease				
owning livestock				

owning amount of land ? _____

G) CROPPING PATTERNS AND CALENDAR

49) Name all the crops grown in the village:

for food _____

for cash _____

Which crops grow in the village soils ? (name all)

a) very well: _____

b) well: _____

c) neither well/ or poorly: _____

d) poorly: _____

e) very poorly: _____

50) Which crops are grown in the different parts of the catena ?

ridgetop: _____

upper sideslope: _____

mid slope: _____

lower sideslope: _____

mbuga/valley: _____

51) What are the main cropping patterns in the village ?

CROP	ACRES	LOCATION	SOIL TYPE	CROP MIX	ROTATION
maize					
sorghum					
cassava					
rice					
millet					
sesame					
groundnut					
beans					
cotton					
other					

NOTE: For rotation, identify crops; for millet, note type (bulrush, finger)

52) What types of vegetables are grown ? _____

What types of fruits are grown ? _____

53) In which months are the following activities carried out ?
(Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec)

CROP	PLOUGH	MANURE	SOWING	WEEDING	HARVEST
maize					
sorghum					
cassava					
rice					
bulrush millet					
finger millet					
sesame					
groundnut					
beans					
cotton					
other					

54) What is the village food situation ? (circle response)

a) PRODUCTION: very good good neither good/poor poor very poor

b) SUFFICIENCY: surplus more than needed just enough inadequate shortage

55) What is the village cash crop situation ?

a) PRODUCTION: very good good neither good/poor poor very poor

b) INCOME: very high high neither high/low low very low

56) How is land given to in-migrants ? (explain)

57) What happens to land left by out-migrants ?

H) DISEASES AND ENVIRONMENTAL HAZARDS

58) How would you rate the risks of the following diseases and environmental hazards in the village ? (tick in responses)

DISEASE/HAZARD	HIGH	MEDIUM	LOW	NONE	Comments
malaria					
measles					
bilharzia					
cholera					
sleeping sickness					
nagana					
ECF					
fires					
erosion					
floods					
droughts					
deforestation					
birds/locusts wildlife					
wastes/pollution					
stock theft					
other					

D) QUALITY OF VILLAGE LIFE

59) How would you rate the quality of village life today in terms of the availability of the following needs ?

Rating Scale	FOOD	WATER	GRAZING	WOOD	SANITATION
5) very satisfactory					
4) satisfactory					
3) neither satisf. nor unsatisf.					
2) unsatisfactory					
1) very unsatisfactory					

60) How would you rate the present social infrastructure ?
(use above rating scale and circle response)

SCHOOL: nearness 5 4 3 2 1

quality 5 4 3 2 1

HEALTH nearness 5 4 3 2 1

SERVIC : quality 5 4 3 2 1

61) How would you rate the availability of the following items over time ?
(use the above rating scale)

ITEM	TODAY	LAST CENSUS	1985	AFTER 1974	BEFORE 1974
cropland					
grazing					
water					
wood					
food					

clothes					
schools					
clinics					
transport					
markets					
goods					
farm input					
extension					
veterinary					
other					

J) VILLAGE DEVELOPMENT, POPULATION AND MIGRATION

62) Is there an ujamaa/communal farm ?

YES NO PLANNED ABANDONED year _____

Types of crops grown: _____

Farm Inputs Used: _____

Crop Output: _____ (bags) Estimated Income (shs): _____

Means of Transport: _____ Transport Costs: _____

Main Problems: _____

63) What kinds of development projects and improvements would the village like to undertake and have ?

CROPS: _____

LIVESTOCK: _____

FORESTRY: _____

EDUCATION: _____

HEALTH: _____

SANITATION: _____

TRANSPORT: _____

MARKETING: _____

CONSERVATION: _____

ADMINISTRATION: _____

OTHER (specify): _____

Are there other cooperative activities ? YES NO PLANNED

Types of activities: _____

64) How would you rate the availability of development resources in the village today ? (tick in response)

development resource	plenty	more than enough	just enough	less than enough	very scarce
cropland					
grazing					
wood					
water					
funds					
expertise					
equipment					

65) What have been the population trends in the village in the last ten years ?
(circle response, note years where possible)

a) PEOPLE: (i) growing rapidly (ii) growing slowly (iii) no change

(iv) slow decrease (v) rapid decrease (vi) don't know

- b) LIVESTOCK: (i) growing rapidly (ii) growing slowly (iii) no change
(iv) slow decrease (v) rapid decrease (vi) don't know

66) What have been the population trends in the village since the last census in 1988 ?

- a) PEOPLE: (i) growing rapidly (ii) growing slowly (iii) no change
(iv) slow decrease (v) rapid decrease (vi) don't know

- b) LIVESTOCK: (i) growing rapidly (ii) growing slowly (iii) no change
(iv) slow decrease (v) rapid decrease (vi) don't know

67) What is your expectation of village population trends in the next five years ?

- a) PEOPLE: (i) grow rapidly (ii) grow slowly (iii) no change
(iv) slow decrease (v) rapid decrease (vi) don't know

- b) LIVESTOCK: (i) grow rapidly (ii) grow slowly (iii) no change
(iv) slow decrease (v) rapid decrease (vi) don't know

68) Are you concerned with changes in the population size of people and livestock in the village ?

YES Reasons why: _____

NO Reasons why not: _____

69) Can the village support more people ? YES NO UNKNOWN

Can the village support more livestock ? YES NO UNKNOWN

70) Would the village accept in-migrants from other places ?

YES Why ? _____

NO Why Not ? _____

Should people move/be encouraged to move out of the village ?

YES Why ? _____

NO Why Not ? _____

K) HUMAN - WILDLIFE INTERACTIONS

71) What wild animals do you see in the village and surrounding areas ?
(write in appropriate codes)

Animals	Frequency	When Seen	Area Seen	Damage Level
elephant				
wildebeest				
zebra				
buffalo				
gazelle				
giraffe				
topi				
warthog				
lion				
leopard				
hyena				
cheetah				
jackal				
quelea birds				
other				
other				

CODES: Frequency: often occasional seldom never When Seen: months
Area Seen: within village around village
Damage Level: lots some little none

L) VILLAGE LOCATION, CATENA, AND LAND USE

Describe the village location, boundaries and boundary markers, altitude, toposequence, grazing areas, soil-crop patterns, etc. with the aid of appropriate maps (1:50,000) and aerial photos (1:68,500). Sketch in a typical catena.

Appendix IIb

UHAMIAJI VIJIJINI KATIKA WILAYA YA SERENGETI MASWALI KUHUSHU FAMILIA

KIJIJI: _____ KATA: _____

Namba ya Shina: _____ Idadi ya familia katika Shina: _____

Namba ya Familia: _____ Mhojiwa: _____

MAELEKEZO KWA MHOJAJI

- 1) Mweleze mhojiwa kusudi na nia ya utafiti na maswali haya.
- 2) Mweleze mhojiwa kwamba majibu yote yatakuwa siri. Mhojiwa si lazima ajibu maswali lakini ushirikiano wake kwenye utafiti hi unahitajika sana na kushukuriwa.
- 3) Uliza kila swali peke yake na kwa ufasaha. Mpe mhojiwa muda wa kufikiri na kujibu. Usimharakishe au kumsaidia kujibu.
- 4) Andika jibu la kila swali kwa ufasaha katika sehemu inayohusika. Unaweza kuzungushia au kuweka alama vema (✓) katika jibu kutokana na orodha ya majibu. Kama itahusika, ongeza jibu ambalo halipo katika orodha ya majibu.
- 5) Hakikisha maswali yote yameulizwa kwenye kila ukurasa. Kama nafasi haitoshi, andika jibu nyuma ya ukurasa. Andika namba ya swali kwenye jibu hilo.
- 6) Usiongelee majibu ya mhojiwa yoyote na mtu anayejibu maswali yako au mtu yoyote mwingine.
- 7) Mshukuru mhojiwa kwa muda, ushirikiano na ukarimu wake.
- 8) Kama hukuweza kumaliza kumhoji, panga muda mwingine wa kumalizia. Onyesha kama umemaliza kuhoji au la.

KUHOJI: umemaliza hujamaliza

Muda mwingine wa kumalizia: _____ (siku)

_____ (saa)

**UHAMIAJI VIJIJINI KATIKA WILAYA YA SERENGETI
MASWALI KUHUSHU FAMILIA**

(A) MAELEZO KUHUSU MHOJIWA NA FAMILIA

(1a) Tafadhali tueleze kama mhojiwa ni mkuu wa familia/kaya ?

NDYIO HAPANA

Mhojiwa ni mume/mke: _____ Umri: _____ (miaka)

Kazi: _____

b) Kama hapana, mkuu wa familia/kaya ni:

mumu/mke: _____ Umri: _____ (miaka) Kazi: _____

c) Je, mkuu ya familia/kaya anaishi;

(i) nyumbani hapa (ii) nyumba nyingine kijijini

(iii) kijiji kingine (iv) mji mwingine (v) nchi nyingine

Jina la kijiji/mji/nchi nyingine

Kazi: _____

(2) Watu wangapi wanaishi katika familia au nyumba hii ?

Idadi ya watu: _____ (jumla)

Idadi ya wazee: watu wazima watoto(< miaka 18)

(3) Lugha gani zina tumika katika familia ?

Majina ya lugha: _____

Lugha gani zinazoweza kuandika na kusomwa ?

Majina ya lugha:

(4) Tafadhali tueleze kuhushu wanafamilia :

KANUNI:

Mtu= mzee/mzima/mtoto MKK= mku wa familia

Me=mume Ke=mke Umri= (miaka)

Kusoma na kuandika= Ndiyo/Hapana

Elimu= (taja darasa) HK= haijulikani

Mtu=Taja uhushiano ya mtu katika familia (mke1, mtoto2, n.k.)

(4) Maelezo kuhushu wanafamilia:

Namba	Mtu	Me/Ke	Umri	Kazi	Kusoma na kuandika	Elimu (darsa)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

(5) Wewe na familia yako mlianza kuishi lini katika kijiji hiki ?
(zungushia jibu sahihi)

(i) tangu kuzaliwa (ii) kabla ya uhuru (1961) (iii) baada ya uhuru

(iv) kabla ya vijiji ya ujamaa (1973-74) (v) baada ya vijiji ya ujamaa

(vi) tangu sensa ya 1978 (vii) tangu uchaguzi wa 1985 (viii) tangu sensa ya 1988

(ix) tangu masika mwaka jana (Nov 1989-May 1990)

(x) tangu kiangazi cha mwisho (June 1990-Oct 1990)

(xi) tangu masika cha mwisho (Nov 1990-May 1991)

(xii) tangu (mwezi/miaka) (xiii) sijui

(B) MAHALI PA KUZALIWA, KUISHI NA UHAMIAJI

- (6) Wewe na familia yako mlizaliwa na kuishi wapi katika vipindi vifuatavyo ?
(Mhojaji, tafadhali taja miaka haswa kama iki wezekana hushu kuzaliwa, kuishi, na uhamiaji)

Mtu	Me/Ke	Umri	Mahali pa Kuzaliwa	Kabla Uhuru	Baada Uhuru	Kabla Vijiji	Baada Vijiji
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Mtu	Sensa 1978	Uchaguzi 1985	Sensa 1988	Masika 1989-90	Kiangazi 1990-91	Masika 1991
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

(Mhojaji, kama nafasi haitatosha, andika maelezo husu wanafamilia wengine nyuma ya ukurasa)

C) NDOA, WATOTO NA UHAMIAJI

- (7) Je, kuna yoyote aliyehama kwa ajili ya ndoa ? (i) Hapana (ii) Ndiyo

Kama ndiyo, (taja); Me/Ke: Umri: Lini ?

amehamia wapi ? _____ (kijiji/kata/mji)

- (8) Je, kuna watoto wowote waliozaliwa katika kijiji cha wazazi wa mama ?

(i) Hapana (ii) Ndiyo

Kama ndiyo, (taja):

	Me/Ke	Umri	Alizaliwa Wapi	Lini (miaka)
1.	_____		_____	
2.	_____		_____	
3.	_____		_____	

(D) ELIMU, AJIRA NA UHAMIAJI

(9) Tafadhali tueleze kama kuna yoyote wa familia yako aliyeenda kwa ajili ya masomo au mafunzo nje ya kijiji ?

(i) Hapana (ii) Ndiyo (iii) Anatarajia kwenda

Kama ndiyo au anatarajia kwenda, (taja):

	Me/Ke	Umri	Wapi ?	Lini ?	Darasa/Mafunzo
1.	_____		_____		_____
2.	_____		_____		_____

(10) Je, kuna yoyote katika nyumba hii aliyehamia katika kijiji hiki kwa ajili ya masomo au mafunzo ?

(i) Hapana (ii) Ndiyo

Kama ndiyo, (taja):

	Me/Ke	Umri	Kutoka wapi ?	Lini ?	Darasa/Mafunzo
1.	_____		_____		_____
2.	_____		_____		_____

(11) Tafadhali tueleze kama kuna yoyote alienda/alieyeenda kufanya kazi nje ya kijiji hiki :

a) (i) Hapana (ii) Ndiyo (iii) Anatarajia kwenda (iv) Alienda na kurudi

b) Kama ndiyo, anatarajia kwenda, au alienda na kurudi, taja:

Me/Ke Umri Wapi ? Lini ? Aina ya Kazi ? Mwaka aliyorudi ?

_____ _____ _____

_____ _____ _____

(12a) Tafadhali tueleze kama unapata au ulipata msaada wowote wakati walipokuwa wakifanya kazi mahali pengine ? (zungushia jibu sahihi)

(i) Hapana Ndiyo

(ii) Kama ndiyo, ni msaada aina gani ?

fedha taslimu nguo madawa chakula vyombo vya nyumbani vifaa vya ujenzi

vifaa vya shambani radio baiskeli pembejeo mabati mbao ushauri elimu

utaalamu Nyingine: _____

(iii) Taja aina ya ushauri au utaalam maalum:

b) Je, familia iliwasaidia kwa njia yeyote wakati wakiwa kazini mahali pengine ?

(i) Hapana Ndiyo

(ii) Kama ndiyo, kwa vipi ? chakula mifugo fedha taslimu kikazi

kuni/makaa mbao dawa ushauri _____

(13) Tafadhali tueleze kama kuna mtu yoyote katika familia hii ambaye ametoka mahali pengine kuja kuishi, kulima au kufanya kazi katika kijiji hiki ?

Hapana Ndiyo

Kama ndiyo, (taja): Me/Ke Umri Kutoka ? Lini ? Kazi ?

(E) UHAMIAJI NA SABABU ZA KUHAMA

(14) Kama umehamia katika kijiji hiki kutoka kijiji kingine au mahali pengine, uliamia lini na kutoka wapi ?

Kutoka kijiji/mahali : _____

kata: _____ Lini ? _____

(15) Kwa nini ulihama kutoka kijiji au mahali ulipokuwa ukiishi ?

(i) Kupata: eneo la kulima, eneo kubwa zaidi la kulima, eneo lenye rutuba zaidi

malisho zaidi, malisho nzuri zaidi, miti ya kujengeya, kuni

mvua zaidi, maji zaidi, maji safi zaidi

(ii) Kwa ajili ya: shule, zahanati, soko, maduka, usafiri, ofisi za serikali

utaalamu wa kilimo utaalumu wa mifugo

(iii) Kukaribia: shule, zahanati, soko, maduka, usafiri, mji, hifadhi, barabara kuu

(iv) Uhamiaji vijijini (1973-74), maendeleo vijijini

(v) Ujangili, wizi wa mifugo, uchawi, urasimu

(vi) Kumiliki: ardhi, mifugo, biashara, nyumba

(vii) Ndoa, utangano katika ndoa, talaka, ujane

(viii) Kutunza wazazi, kujiunga na familia au marafiki

(ix) Kifo katika familia, kifo cha mifugo

(x) Kutokuelewana: katika familia, na marafiki, na majirani, na viongozi wa kijiji

(xi) Kazi, biashara, kuuza bidhaa, uhamisho wa kazi

(xii) Kwa ajili ya: mafuriko, ukame, moto, mmomonyoko mporomoko wa ardhi

maradhi ya mifugo, maradhi ya mimea/mazao

maradhi ya binadamu, wingi wa watu

uharibifu kutokana na wanyamapori

masababu zingine _____

(16) Tafadhali tueleze kwa nini uliamua kuhamia kijiji hiki ? (zungushia jibu sahihi)

a) Kwa sababu ya upatikanaji wa:

(i) eneo kubwa zaidi la kulima (ii) eneo lenye rutuba zaidi

(iii) eneo kubwa zaidi la kufugia (iv) malisho mazuri zaidi

(v) maji mengi zaidi (vi) maji mazuri zaidi

(vii) kuni nyinge zaidi (viii) miti mingi ya kujengaea

(ix) mvua nyingi zaidi (x) mvua za kuaminika zaidi

b) Kwa ajili ya upatikanaji wa huduma za:

(i) shule (ii) zahanati (iii) soko/masoko (iv) maduka

(v) usafiri (vi) utaaalam wa kilimo (vii) utaaalam ya mifugo

(viii) vituo vya kununua mazao (ix) benki ya maendeleo

(x) kazi au ajira

c) Kwa sababu ni karibu zaidi na:

(i) shule (ii) zahanati (iii) soko/masoko (iv) maduka

(v) usafiri (vi) huduma za utaaalam wa kilimo/mifugo

(viii) vituo vya kununua mazao (ix) mji/miji

(x) msikiti, kanisa, n.k. (xi) ofisi ya serikali

d) Kwa sababu ya: (i) uhamiaji vijijini (ii) usalama zaidi

(iii) uhamisho wa kikazi (iv) biashara (v) umilikaji

e) Kwa sababu kuna:

(i) marafiki (ii) familia (iii) ndugu/jamaa (iv) ukoo/kabila

(v) marafiki viongozi (vi) marafiki kijijini (vii) uongozi mazuri zaidi

(viii) hakuna urasimu au kuna urasimu kidogo

(ix) hali nzuri zaidi ya hewa/mazingira

f) Kwa sababu hakuna au kuna hatari kidogo ya:

(i) moto (ii) mafuriko (iii) ukame (iv) ujangili/wizi

(v) uharibifu kutokanao na wanyamapori

(vi) maradhi ya binadamu (malaria, kichocho, malale, n.k.)

(vii) maradhi ya mifugo (kimeta, sotoka, malale, n.k.)

(viii) maradhi ya mimea au mazao (nzige, viwanajeshi,)

(ix) mmomonyoko wa udongo (x) mporomoko wa ardhi

g) Kubadilisha hewa/mazingira

h) Hakuna sababu maalum Sijui

(17) Je, umepata mahitaji uliyoyafuatia kwenye kijiji hiki ?

(i) Hapana Ndiyo

(ii) Kama ndiyo, ni mahitaji gani umepata ?

(iii) Kama ni hapana, ni mahitaji gani hukupata ?

Kwa nini ? _____

(18) Tafadhali tueleze kama watu wote ya familia yako walihamia hapa au wengine walibakia au walikwenda mahali pengine ?

a) wote walihamia hapa weingine walibakia weingine walikwenda mahali pengine

b) Kama wengine walibakia, eleza ni nani na kwa nini ?

(i) Walibakia: _____

(ii) Kwa nini ? _____

c) Kama wengine walikwenda mahali pengine, tafadhali eleza:

(i) Ni nani ? _____

(ii) Walikwenda wapi ? _____

(iii) Kwa nini ? _____

(19) Ni sehemu gani nyingine zaidi ya kijiji hiki ambayo ulifikiria kuhamia ?

(i) mahali/kijiji/mji _____

(ii) Kwa nini ? _____

(iii) Kwa nini ukaamua kutokwenda kwenye sehemu hizo ?

(20a) Tafadhali tueleze jinsi wewe na familia yako mulivyohamia hapa:

(i) Baba aliamia hapa kwanza na weingine wakafuata baadaye

(muda) _____ (siku/wiki/mwezi/mwaka)

(ii) Mama/mke aliamia hapa kwanza na wengine wakafuata baadaye

(muda) _____ (siku/wiki/mwezi/mwaka)

(iii) Kijana/binti aliamia hapa kwanza na wengine wakafuata baadaye

(muda) _____ (siku/wiki/mwezi/mwaka)

(iv) Wote mlihamia pamoja

(v) Vinginevyo: _____

b) Je, mlihamia hapa moja kwa moja au milishi mahali pengine kwa muda ?

(i) tulihamia moja kwa moja (ii) tuliishi mahali pengine kwa muda

Kama mliishi mahali pengine kwa muda, ni wapi ? _____

Kwa muda gani ? _____ Kwa nini ? _____

c) Wakati wa kuhamia mlikodisha usafiri au msaada aina yoyote ?

(i) Hapana Ndiyo

(ii) Kama ndiyo, tafadhali eleza: _____

(21a) Mlijenga au kununua au kukodisha nyumba hapa kijijini kabla ya kuhamia ?

(i) hapana (ii) nilijenja (iii) nilinunua (iv) nilikodisha

(v) nilimiliki (vi) nilikaa pamoja na jamaa/marafiki/ukoo

b) Je, ulifyeka au kununua au kulima shamba kwenye kijiji hiki kabla ya kuhamia ?

(i) hapana (ii) nilifyeka shamba (iii) nilinunua shamba

(iv) nilikodisha shamba (v) nilimiliki

(vi) nilishirikishwa kwenya shamba ya familia, rafiki

(vii) nilitumia shamba la kijiji

(22) Tafadhali tueleze kama ulisaidiwa na yeyote wa kijiji hiki kujenga nyumba yako, kufyeka au kustawisha shamba lako ?

Hapana Ndiyo

(i) Kama hapana, (taja) ni nani: alijenga nyumba ? _____

aliye fyeka shamba ? _____ aliyestawisha shamba ? _____

(ii) Kama ndiyo, ulipata msaada wakina nani ? (zungushia jibu sahihi)

familia pkee marafiki wanakijiji wanadini vibarua

(iii) Ni msaada gani ? wa kujenga nyumba wa kufyeka shamba

wa vifaa vya kulima wa maksai

wa pembejeo wa kustawisha shamba

(22) Tafadhali tueleze ulifunzaje kuhushu hali ya hapa kijijini ?

Kutokana na:

(i) kutembelea kijiji hiki kwa muda mfupi

(ii) kutembelea kijiji hiki mara nyingi

(iii) kufanya kazi hapa siku zilizopita

(iv) familia inayoishi hapa (v) marafiki wanaoishi hapa

- (v) kiongozi wa kijijini hapa (vi) soko la hapa
 (vii) familia na/au marafiki wanaoishi kijiji ulichohama
 (viii) kiongozi wa kijijini mlikohama
 (ix) soko la kijiji mlikohama (x) matangazo ya redio
 (xi) kusoma magazetini (xii) matangazo/amri ya serikali
 (xv) sikubuki au sijuhi

(F) RASILIMALI NA HUDUMA KWENYE MAENEO YALIOHAMWA

- (23) Utakadiriaje upatikanaje na ubora wa rasilimali zilizopo kwenye eneo ulilohama ?
 (weka vema kuonyesha jibu)

	mvua	ardhi	rutuba	maji	malisho	miti
Inaridhisha						
~~gana~~						
Inaridhisha						
Wastani						
Hairidhishi						
Hairidhishi						
~~kabisa~~						
Sikumbuki						

- (24a) Tafadhali tueleze huduma za jamii ulikuwa unapata kwenye kijiji ulichohama
 (zungushia jibu sahihi):

shule zahanati usafiri soko maduka maji ya bomba maji ya kisima

kituo cha polisi chanjo mafunzo ya uzazi wa majira mafunzo ya malezi bora

- b) Ni aina gani ya huduma za jamii ulizokuwa unapata kutoka nje ya kijiji chako
 (kwa mfano kijiji/mji ya jirani) ?

shule zahanati usafiri soko maduka maji ya bomba maji ya kisima

kituo cha polisi chanjo _____

- c) Utakadiriaje huduma za jamii kwenye eneo ulilohama ?

	shule	zahanati	soko	usafiri	maduka	usalama
Iiridhisha sana						
Iiridhisha						
Wastani						
Hakuridhisha						
Hakuridhisha kabisa						
Sikumbuki						

Utakadiriaje uongozi katika kijiji ulichohama ? _____

(25a) Tafadhali tueleze huduma za kilimo ulizokuwa unapata kwenye kijiji ulichohama (zungushia majibu sahihi) :

mbegu kisasa, mbolea chumvi, madawa, jembe, panga, shoka, jembe maksai

trekta, mikokoteni, mikokoteni ya maksai, gari ndogo, malori, basi

maghala, utaalam wa kilimo, utaalam wa mifugo, miche ya miti, miche ya matunda

mnada

b) Ni aina gani ya huduma za kilimo ulizokuwa unapata kutoka nje ya kijiji ulichohama?

c) Utakadiriaje huduma za kilimo kwenye eneo ulilohama ?
(weka vema kuonyesha jibu au tumia kivango cha uridhishi)

	vifaa	pembejeo	maghala	soko la mazao	bei ya mazao
Iliridhisha sana					
Iliridhisha					
Wastani					
Hakuridhisha					
Hakuridhisha kabisa					
Sikumbuki					

Utakadiriaje huduma ya usafirishaji wa mazao ? _____

utaalam wa kilimo ? _____

d) Utakadiriaje huduma za mifugo katika eneo ulilohama ?

(i) upatikanaji wa madawa:

(ii) utaalam wa mifugo:

(iii) mnada: bei ya mifugo:

(iv) uzuiaji wa maradhi:

(26a) Utakadiriaje hatari za mazingira katika eneo ulilohama ?

Hatari	ukame	moto	wanyama waharibifu	mmomonyoko	mafuriko
Kubwa sana					
Kubwa					
Wastani					
Ndogo					
Ndogo sana					
Sijui					

Hatari	Magonjwa ya binadamu mifugo mazao			njaa	ukosefu wa malisho
Kubwa sana					
Kubwa					
Wastani					
Ndogo					
Ndogo sana					
Sijui					

b) Utakadiriaje hatari za kumalizika kwa misitu ? _____

(G) RASILIMALI NA HUDUMA KWENYE ENEO UNAPOISHI

(27) Utakadiriaje upatikanaji na ubora wa rasilimali katika kijiji hiki ?
(weka vema kuonyesha jibu)

	mvua	ardhi	rutuba	maji	malisho	miti
Inaridhisha sana						
Inaridhisha						
Wastani						
Hairidhishi						
Hairidhishi kabisa						
Sikumbuki						

(28a) Tafadhali tueleze huduma za jamii azoweza kupatikana katika kijiji hiki
(zungushia majibu sahihi) :

shule zahanati usafiri soko maduka maji ya bomba maji ya kisima

kituo cha polisi chanjo mafunzo ya uzazi wa majira/malezi bora

b) Tafadhali tueleze huduma za jamii unazopata nje ya kijiji hiki na hazipatikani hapa
kijijini:

c) Utakadiriaje huduma za jamii katika kijiji hiki ?

	shule	zahanati	soko	usafiri	maduka	usalama
Iiliridhisha sana						
Iiliridhisha						
Wastani						
Hakuridhisha						
Hakuridhisha kabisa						
Sikumbuki						

Utakadiriaje uongozi katika kijiji hiki ? _____

(29a) Tafadhali tueleze huduma za kilimo unazopata katika kijiji hiki (zungushia majibu sahihi) :

mbegu kisasa, mbolea chumvi, madawa, jembe, panga, shoka, jembe maksai
trekta, mikokoteni, mikokoteni ya maksai, gari ndogo, malori, basi
maghala, utaalam wa kilimo, utaalam wa mifugo, miche ya miti,
miche ya matunda, mnada

b) Utakadiriaje huduma za ufugaji katika kijiji hiki ?
(Mhojaji, tumia kanuni ya ukadiriaje wa huduma)

(i) upatikanaji wa madawa:

(ii) upatikanaji/hali ya joshu:

(iii) chanjo:

(iv) utaalam wa mifugo:

(v) uzuiaji wa magonjwa:

c) Utakadiriaje huduma za kilimo katika kijiji hiki ?

	vifaa	pembejeo	maghala	soko la mazao	bei ya mazao
Inaridhisha sana					
Inaridhisha					
Wastani					
Hairidhishi					
Hairidhishi kabisa					
Sijui					

(30) Utakadiriaje hatari za mazingira katika kijiji hiki ?

Hatari	ukame	moto	wanyama waharibifu	mmomonyoko	mafuriko
Kubwa sana					
Kubwa					
Wastani					
Ndogo					
Ndogo sana					
Sijui					

Hatari	Magonjwa ya binadamu mifugo mazao			njaa	ukosefu wa malisho
Kubwa sana					
Kubwa					
Wastani					
Ndogo					
Ndogo sana					
Sijui					

(31) Unakadiriaje masuala yafuatayo katika kijiji hiki kulinganisha na mahali ulipohama? (weka vema kuonyesha jibu)

	Nzuri zaidi sana	Nzuri zaidi	Hamna tofauti	Mbaya zaidi	Mbaya zaidi sana	Sijui
Ardhi						
Rutuba						
Malisho						
Usalama						
Mvua						
Maji						
Miti						
Shule						
Zahanati						
Usafiri						
Pembejeo						
Vifaa Kilimo						
Soko mazao						
Mnada						
Maduka						
Utaalam						
Uongozi						
Bei ya Pembejeo						
Bei ya Vifaa						
Bei ya Usafiri						
Bei ya Bidhaa						
Bei ya Mazao						
Bei ya Madawa						

	Nzuri zaidi sana	Nzuri zaidi	Hamna tofauti	Mbaya zaidi	Mbaya zaidi sana	Sijui
Afya ya Familia						
Afya ya Mifugo						
Hali ya Mazingira						

(32) Unakadiriaje ubora wa maisha kwa ujumla katika kijiji hiki kulinganisha na mahali uliokhama ?

	Nzuri zaidi sana	Nzuri zaidi	Hamna tofauti	Mbaya zaidi	Mbaya zaidi sana	Sijui
Mahali ulipokhama						
Kijiji hiki						
Kijiji cha jirani						
Mji wa jirani						
Vijiji vingine wilayani						
Vijiji vingine mkoani						

(H) UWEZEKANO WA KUHAMA

(33a) Umewahi kutembelea tena mahali ulipokhama ? (zungushia jibu sahihi)

(i) Hapana (ii) Ndiyo

Kama hapana, kwa nini ? _____

Kama ndiyo, mara ngapi ? _____

kwa nini ? _____

b) Unategemea kwenda kuishi tena huko ?

(i) Hapana (ii) Ndiyo (iii) Labda

Kama hapana, kwa nini ? _____

Kama ndiyo au labda, kwa nini ? _____

c) Unafikiri kuwa kuhama kwako kule ulikokuwa unaishi ni wazo la busara ?

Ndiyo Hapana Sijui

Unafikiri kuwa kuhamia hapa lilikuwa wazo la busara au sivyo ?

Ndiyo Hapana Sijui

(34a) Umewahi kuwaza kuhushu kuhama katika kijiji hiki kwenda kuishi mahali pengine ?

Hapana Ndiyo

Kama hapana, kwa nini ? _____

Kama ndiyo, ni wapi ? (weka vema kuonyesha jibu)

(i) sehemu nyingine katika kijiji hiki (ii) nje ya kijiji hiki

(iii) kijiji kingine (taja jina) _____

(iv) kata nyingine (taja jina) _____

(v) mji (taja jina) _____

(vi) mkoa au nchi nyingine (taja jina) _____

b) Umefikiria kuhama kijiji hiki mara ngapi ?

(i) mara chache sana (ii) mara chache (iii) mara nyingi

(iv) mara nyingi sana (v) nimefikiria lakini sijaamua

(vi) nimeshaamua kuhama (vii) ninahama

c) Umewahi kutembelea mahali unapotegemea kuhamia ?

(i) hapana ndiyo

(ii) Kama ndiyo, umetembelea mara ngapi ? _____

kwa muda gani ? _____ (siku/wiki/mwezi)

kwa sababu gani ? _____

d) Unafikiri utakuwa na maisha bora zaidi huko ?

(i) Hapana Ndiyo Siwezi kusema

(ii) Kama hapana, kwa nini ? _____

(iii) Kama ndiyo, kwa nini ? _____

(iv) Kama huwezi kusema, kwa nini ? _____

e) (i) Umeamua/kupanga mwenyewe kuhama au umejadiliana na familia, jamaa, wenzako, n.k. ?

Umeamua/kupanga: mwenyewe na familia na jamaa na marafiki

na wakubwa wangu na viongozi vijijini

(ii) Kwa muda gani umekuwa ukiwaza kuhama ?

Tangu: _____ (siku/wiki/mwezi/mwaka)

Umewaza: mara chache mara kwa mara mara nyingi

(I) UHUSIANO, MSAADA KIJAMII NA UHAMIAJI

(35a) Je, una familia, jamaa, marafiki au yeyote katika kijiji hiki ambaye unamsaidia au kupata msaada kutoka kwake ?

(Mhojaji, andika Ndiyo/Hapana na taja aina ya msaada)

	Familia	Ndugu/Jamaa	Marafiki	wanakijiji
Hapana/Ndiyo				
Msaada uliotoa				
Msaada uliopokea				

b) Je, uliwahi kutoa au kupata msaada kutoka kwa familia, ndugu, n.k. katika kijiji ulichokuwa ukiishi kabla ?

	Familia	Ndugu/Jamaa	Marafiki	wanakijiji
Hapana/Ndiyo				
Msaada uliotoa				
Msaada uliopata				

(36a) Ni shughuli zipi za ushirika ambazo wewe na familia yako hushirikiana na wanakijiji wengine ? (zungushia jibu sahihi)

(i) shamba la kijiji (ii) kujenga (iii) usalama (iv) elimu (v) afya

(vi) kuzuia wanyama waharibifu (vii) kazi za kijamaa (viii) michezo

(ix) ushauri (x) utawala wa maji (maelezo nyingine): _____

b) Je, ulifanya/mlifanya hivyo pia kwenye kijiji mlichohama ?

(i) Hapana Ndiyo

(ii) Kama ndiyo, ni shughuli zipi ? _____

(37a) Ni mara ngapi unashiriki kwenye shughuli za kijiji ?

kila siku, mara 3 kwa wiki, mara 1 kwa wiki
mara 1 kwa wiki mbili, mara 1 kwa mwezi, kila mwezi 3
mara 1 kila mwezi 6, mara moja kwa mwaka,
kila ninapoarifiwa, sishiriki kabisa

b) Ni mara ngapi ulikuwa unashiriki kwenye shughuli za kijiji mahali ulipohama ?

(Taja ni mara ngapi): _____

(38a) Tafadhali tueleze kama unamdaraka yoyote katika uongozi wa kijiji ?

(i) Hapana Ndiyo

(ii) Kama ndiyo, ni madaraka gani ? _____

tangu lini ? _____

kwa muda gani ? _____

b) Je, ulikuwa na madaraka yoyote kwenye kijiji ulichohama ?

(i) Hapana Ndiyo

(ii) Kama ndiyo, ni madaraka gani ? _____

kwa muda gani ? _____

(39a) Tafadhali tueleze kama kuna kijiji, serikali, chama, n.k. ambacho kinakupa msaada wa mahitaji yako katika kijiji hiki ?

(i) Hapana Ndiyo

(ii) Kama ndiyo, taja aina ya chama, n.k. _____

aina ya msaada _____

b) Je, kulikuwa kijiji, serkali, chama, n.k. ambayo ilikupa msaada wa mahitaji yako katika kijiji ulichohama ?

(i) Hapana Ndiyo

(ii) Kama ndiyo, taja aina ya chama, n.k. _____

aina ya msaada _____

(40a) Tafadhali tueleze kama unalima, sitawisha, fuga, jenga, karabati nyumba yako, n.k. kwa msaada kutoka kwa yoyote ?

(i) Hapana Ndiyo

(ii) Kama ndiyo, ni nani anakusaidia ? _____

wanatoka wapi ? _____

(iii) Je, unalipia msaada huo ? Hapana Ndiyo

Kama ndiyo, aina ya malipo ni:

fedha taslim, mifugo, mazao, chakula/pombe, mabadilishano, ushirikiano

b) Je, ulilima, sitawisha, fuga, n.k. kwa msaada kutoka kwa yoyote kwenye mahali ulipohama ?

(i) Hapana Ndiyo

(ii) Kama ndiyo, ni nani alikusaidia ? _____

wali toka wapi ? _____

ulilipiaje msaada huo ? _____

(41) Tafadhali tueleze ni nani ungemwomba au uliwahi kumwomba msaada ili kupata mahitaji yafuatayo ? (tumia kanuni kuandika majibu)

Mahitaji	Katika Kijiji Hiki	Katika kijiji Ulichohama
Ardhi		
Maksai		
Mkopo		
Watu wa Kazi		
Vifaa vya Shambani		
Pembejeo		
Maghala		
Usafirishaji (mazao)		
Chakula/nguo		
Nyingine		

KANUNI: 1=familia 2=ndugu/jamaa 3=ukoo/kabila 4=marafiki
5=majirani 6=uongozi wa kijiji 7=wanakijiji
8=msikiti/kanisa/wanadini 9=serikali

- (42) Utakadiriaje uhusiano wako na ndugu, jamaa, marafiki, n.k. katika kijiji hiki ?
(weke vema kuonyesha jibu sahihi)

Inaridhisha sana	familia	ndugu/jamaa	majirani	marafiki
Inaridhisha				
Inaridhisha wastani				
Hairidhishi				
Hairidhishi kabisa				
Sijui				

Utakadiriaje uhusiano wako na:

(i) viongozi wa kijiji ? _____

(ii) wanakijiji ? _____

- (43a) Tafadhali tueleze kama ungefikiria kuhama sehemu nyingine humu ndani ya kijiji hiki au nje ili kuwa na uhusiano nzuri zaidi wa kijamii ? (zungushia jibu sahihi)

(i) ndani ya kijiji hiki (ii) nje ya kijiji

(iii) kwenye kijiji kingine (iv) makao mkuu ya wilaya

(v) mjini (vi) sina uhakika (vii) sina hamu/sihami

b) Kama ungefikiria kuhama, je, ungehama mwenyewe, au na sehemu ya familia au na familia wote ?

(i) mwenyewe, na sehemu ya familia, na familia wote

(ii) Kama ni mwenyewe pekee, kwa nini ? _____

(iii) Kama ni sehemu ya familia, ni akina nani wangebakia ?

_____ Kwa sababu: _____

(44) Utalinganishaje uhusiano wako na familia, ndugu/jamaa, n.k. kwenye kijiji ulichokuwa unaishi ? (weka vema kuonyesha jibu sahihi)

	familia	ndugu/ jamaa	majirani	marafiki
Iliridhisha sana				
Iliridhisha				
Iliridhisha wastani				
Hakuridhishi				
Hakuridhishi kabisa				
Sijui				

Utakadiriaje uhusiano wako na viongozi wa kijiji ulichohama ?

Utakadiriaje uhusiano na wanakijiji wa kijiji ulichohama ?

(45) Utakadiriaje uhusiano wako na jamii kwenye kijiji hiki ukilinganisha na mahali ulipokuwa unaishi ?

Uhusiano na	Mazuri zaidi sana	Mazuri zaidi	Hamna tofauti	Mbaya zaidi	Mbaya zaidi sana	Sijui
Familia						
Ndugu/jamaa						
Marafiki						
Majirani						
Viongozi						
Wanakijiji						

(46) Tafadhali tueleze kama ulihama kutoka ulipokuwa unaishi awali kwa sababu zozote za kutoelewana ?

(i) ndani ya familia (ii) na ndugu/jamaa (iii) na majirani (iv) na wanakijiji

(v) na viongozi (vi) na kiongozi dini (vii) na mtumishi wa serikali (viii) na wengine

(J) MATUMIZI YA ARDHI, UIMARISHAJI KILIMO NA UHAMIAJI

(47) Tafadhali tueleze tabia na utendaji kazi shambani mwako :

(Mhojaji, kwa majibu 'ndiyo', weka vema; au tumia kanuni)

(Swali 47; kwa familia zote)

KANUNI: Uelekeo wa mlima: A=kilele cha mlima B=mwanzo ya mteremko
C=kati ya mteremko D=mwisho ya mteremko
E=mbugani/bondeni

Aina ya udongo: mchanga, udongo, tifutifu, n.k.

Rangi ya udongo: nyekundu, nyeusi, nyeupe, khaki, n.k.

Jinsi ulivyopata shamba: serikali kijiji, umiliki, n.k.

Shamba/tabia/utendaji	1	2	3	4	5
Ukubwa (ekari)					
Uelekeo wa mlima					
Muda wa kutembea					
Aina ya udongo					
Rangi ya udongo					
Rutuba					
Mazao yaotehswayo					
Mwaka poanza kutumia					
Jinsi livyopatikana					
Vifaa unavyotumia					
Samadi					
Mboji					
Mbolea (chumvi)					
Takataka jikoni					
Mbegu za kisasa					
Shamba/tabia/utendaji	1	2	3	4	5
Madawa					
Kilimo mchanganyiko					
Kilimo mzunguko					
Kilimo kupumzisha					
Kuchoma magugu					
Kulima magugu					
Umwagiliaji					
Kilimo cha matuta					
Kuzuia mmomonyoko					
Linapaliliwa mara					
Unaajiri vibarua					
Uzuiaji wa uharibifu					
Unalishia mifugo					
Hali ya mavuno					
Mavuno kwa mwaka					

(48) Tafadhali tueleze tabia na utendaji kazi shambani mwako katika kijiji ulichohama : (weka vema na tumia kanuni) (Swali 48; kwa wahamiaji tu)

Shamba/tabia/utendaji	1	2	3	4	5
Ukubwa (ekari)					
Uelekeo wa mlima					
Muda wa kutembea					
Aina ya udongo					
Rangi ya udongo					
Rutuba					
Mazao yaotehswayo					
Mwaka poanza kutumia					
Jinsi livyopatikana					
Vifaa unavyotumia					
Shamba/tabia/utendaji	1	2	3	4	5
Samadi					
Mboji					
Mbolea (chumvi)					
Takataka jikoni					
Mbegu za kisasa					
Madawa					
Kilimo mchanganyiko					
Kilimo mzunguko					
Kilimo kupumziisha					
Kuchoma magugu					
Kulima magugu					
Umwagiliaji					
Kilimo cha matuta					
Kuzuia mmomonyoko					
Linapaliliwa mara					
Unaajiri vibarua					
Uzuiaji wa uharibifu					
Unalishia mifugo					
Hali ya mavuno					
Mavuno kwa mwaka					

(49) Tafadhali tueleze hali ya mashamba yako katika kijiji hiki :

Hali ya	Mengi sana	Mengi	Wastani	Kidogo	Kidogo sana	Sijui
Mavuno						
Rutuba						
Magugu						
Wanyama/ wadudu						
Mmomonyoko						
Magadi						
Nguvu za utendaji						

(50) Ni nini mwelekeo wa mashamba lako tangu sensa iliopita (1988) ?
(weka vema kuonyesha jibu sahihi)

Mwelekeo	Mavuno	Rutuba	Magugu	Wanyama /wadudu	Nguvu za utendaji
Kuna ongezeko la haraka					
Kuna ongezeko					
Hamna tofauti					
Kupungua					
Kupungua kwa haraka					
Sijui					

Ni nini mwelekeo wa mmomonyoko ? _____

wa magadi/chumvi ? _____

(51a) (i) Tafadhali tueleze ni akina nani kwenye familia wanaofyanya kazi katika mashamba yako ? (maelezo kuhusu kila shamba; tumia kanuni)

(ii) Ni akina nani kwenye familia wanafanya kazi zaidi ?

(iii) Ni akina nani kwenye familia wanaofanya kazi katika shamba la kijiji ?

b) Je, kuna ndugu/jamaa anayesaidia kazi kwenye mashamba ?

c) Je, kuna vibarua walioagiriwa ? Wanalipwaje ?

d) Kuna watu wanaosaidia kazi wakupewa chakula/pombe (msaragambo) ?

KANUNI: Shamba lilipo A) muinuko B) mwanzo wa mteremuko
C) kati wa mteremuko D) mwisho wa mteremuko
E) mbugani/bondeni

Wanaofyanya kazi (familia): 1=baba 2=mama 3=watoto
(taja idadi kamili)

Shamba	1	2	3	4	5	Kijiji
Shamba lilipo						
Wanaofyanya kazi kwenye shamba						
Wanaofyanya kazi zaidi						
Ndugu au jamaa						
Vibarua (malipo)						
Vibarua (mavuno)						
Msaragambo						

(52) Tafadhali tueleze wafutao wanafanya kazi gani shambani na ni kipindi gani ?
(weka vema kuonyesha jibu)

Kazi/kipindi	baba	mama	watoto	ndugu	vibarua	m'gambo
Kufyeka						
Kulima jembe						
Kulima maksai						
Kutegeneza matuta						
Kupanda						
Kupalilia						
Kuweka mbolea						
Kumwagilia						
Kuwinga						
Kuvuna						
Kutayarisha mavuno						
Kusafirisha						
Kuuza						
Kununua pembejeo						

(53a) Tafadhali tueleze hali ya mashamba yako mahali ulipokuwa unaishi ilikuwaje ?
(weka vema kuonyesha jibu)

Hali ya	Mengi sana	Mengi	Wastani	Kidogo	Kidogo sana	Sijui
Mavuno						
Rutuba						
Magugu						
Wanyama/ wadudu						
Mmomonyoko						
Magadi						
Nguvu za Utendaji						

b) Tafadhali tueleze mwelekeo wa shamba lako kabla ya kuhama ulikuwaje ?

Mwelekeo	Mavuno	Rutuba	Magugu	Wanyama /wadudu	Nguvu za utendaji
Kuna ongezeko la haraka					
Kuna ongezeko					
Hamna tofauti					
Kupungua					
Kupungua kwa haraka					
Sijui					

(54a) (i) Tafadhali tueleze ni akina nani kwenye familia walikuwa wanafanya kazi katika mashamba yako mahali ulipohama ? (maelezo kuhusu kila shamba; tumia kanuni)

(ii) Ni akina nani kwenye familia waliokuwa wanafanya kazi zaidi ?

(iii) Ni akina nani kwenye familia waliokuwa wanafanya kazi katika shamba la kijiji?

(54a) (i) Tafadhali tueleze ni akina nani kwenye familia walikuwa wanafanya kazi katika mashamba yako mahali ulipohama ? (maelezo kuhusu kila shamba; tumia kanuni)

(ii) Ni akina nani kwenye familia waliokuwa wanafanya kazi zaidi ?

(iii) Ni akina nani kwenye familia waliokuwa wanafanya kazi katika shamba la kijiji?

b) Je, kuna ndugu/jamaa aliyekuwa anasaidia kazi katika mashamba yako ?

c) Je, ulikuwa unaajiri vibarua ? Walikuwa wanalipwaje ?

d) Kuna watu waliokuwa wanasaidia kazi wakapewa chakula/pombe (msaragambo) ?

KANUNI: Shamba lilipo A) kilele ya mlima B) mwanzo wa mteremko
C) kati wa mteremko D) mwisho wa mteremko
E) mbugani/bondeni

Wanaofyanya kazi (familia): 1=baba 2=mama 3=watoto
(taja idadi kamili)

Shamba	1	2	3	4	5	Kijiji
Shamba lilipo						
Wanaofyanya kazi kwenye shamba						
Wanaofyanya kazi zaidi						
Ndugu au jamaa						
Vibarua (malipo)						
Vibarua (mavuno)						
Msaragambo						

(55) Tafadhali tueleze wafuatao walikuwa wanafanya kazi gani shambani na ni kipindi gani mahali uliopohama ?

Kazi/Kipindi	baba	mama	watoto	jamaa	vibarua	m'gambo
Kufyeka						
Kulima jembe						
Kulima maksai						
Kutegeneza matuta						
Kupanda						
Kupalilia						
Kuweka mbolea						
Kumwagilia						
Kuwinga						
Kuvuna						
Kutayarisha mavuno						
Kusafirisha						
Kuuza						
Kununua pembejeo						

Ni akina nani walikuwa wanauza mazao ? _____

Ni akina nani walikuwa wananunua pembejeo ? _____

(K) UFUGAJI NA UHAMIAJI

(56a) Ni mifugo aina gani ulio nao hapa na uliokuwa nao huko ulipohama ?
(taja idadi; mifugo nyingine)

Ngombe Maksai Mbuzi Kondoo Punda

Kijiji hiki _____

Kijiji ulichohama _____

Tafadhali tueleze kama umempa mtu yeyote jukumu la kuangalia mifugo yako mbali na eneo la kijiji ?

Kijiji hiki: Hapana Ndiyo mifugo yote sehemu tu

Kama ndiyo, ni nani ? _____ ni wapi ? _____

tangu lini ? _____ kwa nini ? _____

unamlipaje ? _____

Kijiji ulichohama: Hapana Ndiyo mifugo yote sehemu tu

Kama ndiyo, ni nani ? _____ ni wapi ? _____

tangu lini ? _____ kwa nini ? _____

unamlipaje ? _____

(57) Ni wapi unapata maji kwa ajili ya mifugo yako msimu wa mvua na wa kiangazi ?

	Kijiji hiki	Kijiji ulichohama
Msimu wa Mvua	_____	_____
Msimu wa Kiangazi	_____	_____
umbali wa maji: (dakika/saa)	_____	_____

(58a) Tafadhali tueleze ni wapi na ni nini unachowalisha mifugo wako katika kijiji hiki?
(tumia kanuni kuandika majibu)

Kipindi	Sehemu	Uelekeo wa mlima	Aina ya malisho	Upati- kanaji	Ubora	Umiliki wa eneo
Vuli						
Vuli-Masika						
Masika						
Kupanda						
Kuvuna						
Kiangazi						

b) Ni wapi na ni kitu gani ulikuwa unawalisha mifugo yako mahali ulipokuwa unaishi?
(tumia kanuni kuandika majibu)

Kipindi	Sehemu	Uelekeo wa mlima	Aina ya malisho	Upati- kanaji	Ubora	Umiliki wa eneo
Vuli						
Vuli-Masika						
Masika						
Kupanda						
Kuvuna						
Kiangazi						

KANUNI:

(a) sehemu 1=ndani ya kijiji 2=nje ya kijiji 3=kijiji kingine

(b) uelekeo 1=kilima 2=kilele cha mlima 3=mteremko 4=bonde/mbuga

(c) aina ya malisho 1=nyasi 2=mazao yaotayo 3=mabaki ya mazao

(d) upatikanaji wa malisho 1=mengi sana 2=yakutosha 3=hayatoshi

4=hakuna kabisa

(e) ubora wa malisho 5=mazuri sana 4=mazuri 3=ya wastani

2=mbaya 1=mbaya sana

(f) umiliki wa eneo 1=la binafsi 2=la marafiki/majirani

3=la kijiji/ushirika 4= la shirika

5=hifadhi ya misitu 6=hifadhi ya wanyama

(59a) Je, huwa unastawisha, unanunua au unawatafutia chakula mifugo yako ?
(zungushia jibu sahihi)

ninastawisha, ninanunua, ninawatafutia, huwa wanachungwa

ninawafungua wanakula wenyewe

b) Je, umeajiri kibarua yoyote kuchunga mifugo yako ?

Hapana Ndiyo Kama ndiyo, wangapi ? _____

Kuwa muda gani ? _____ Unawalipaje ? _____

(60a) Tafadhali tueleze kama ulikuwa unastawisha, kununua, au kuwatafutia mifugo yako chakula mahali ulikohama ?

niliastawisha, nilinunua, niliwatafutia, huwa walichungwa

niliwafungua wakikula wenyewe

b) Je, ulikuwa umeajiri kibarua yoyote kuchunga mifugo yako mahali uliohama ?

Hapana Ndiyo Kama ndiyo, wangapi ? _____

Kuwa muda gani ? _____

Uliwalipaje ? _____

(61) Tafadhali tueleze ni magonjwa aina gani yaliowahi kushambulia mifugo yako katika kijiji hiki na kule ulipohama ?

Kijiji hiki: _____

Kijiji ulikohama: _____

(62a) (i) ni huduma zipi unazopata kwa ajili ya mifugo katika kijiji hiki ?

Aina za huduma: _____

(ii) ni huduma zipi ulikwa unazopata kwa ajili ya mifugo yako katika kijiji ulichohama ?

Aina za huduma: _____

(iii) Ni wapi kuna huduma nzuri zaidi ?

kijiji hiki, kijiji ulichohama, mahali pengine

(taja jina ya mahali) _____

(L) UPATIKANAJI WA CHAKULA, KIPATO NA UHAMIAJI

(63a) Tafadhali tueleze kama una uwezo wa kutimiza familia yako na mahitaji ya chakula ?

Hapana Ndiyo

(i) Kama hapana, kwa nini ? _____

(ii) Kama ndiyo, kwa nini ?

.....

b) Je, ulikuwa na uwezo wa kutimiza familia yako mahitaji ya chakula kule ulikokuwa unaishi ?

Hapana Ndiyo

(i) Kama hapana, kwa nini ? _____

(ii) Kama ndiyo, kwa nini ?

.....

(64a) Katika njia zifuatazo ni ipi unayoitumia kupata chakula chako ?
(zungushia jibu sahihi)

kustawisha chote, kustawisha baadhi, kukusanya, kuwinda

kununua, kuazima, kubadilishana, msaada wa serikali

msaada wa kanisa, n.k. kwa kupewa, kwa kuomba/sadaka

nyinginezo: _____

b) Ni njia ipi uliokuwa unatumia kupata chakula chako kule uliohama ?

kustawisha chote, kustawisha baadhi, kukusanya, kuwinda

kununua, kuazima, kubadilishana, msaada wa serikali

msaada wa kanisa, n.k. kwa kupewa, kwa kuomba/sadaka

nyinginezo: _____

(65a) Utakadiriaje hali ya chakula kwenye familia kwa muda ?
(weka vema kuonyesha majibu)

Kipindi	Kingi sana	Zaidi ya kutosha	Kina- chotosha	Haiki- toshi	Njaa
Mwaka uliopita					
Tangu sensa					
Tangu 1985					
Mwaka kabla ya kuhama					
Miaka mitano kabla kuhama					
Tangu vijijini					
Tangu uhuru					
Tangu kuzaliwa					

b) Unategemea hali ya chakula kwenye familia yako itakuaje mwaka ujao, ukizingatia hali ya sasa ya mvua ? (zungushia jibu sahihi)

(i) kingi sana (ii) zaidi ya kutosha (iii) cha kutosha

(iv) hakitatosha (v) njaa (vi) siwezi kubashiri

(66a) Ni katika miezi ipi ina hali zifuatazo za chakula ?

Ziada: _____ Zaidi ya kinachotosha: _____

Kinachotosha tu: _____ Upungufu: _____

Njaa: _____

b) Kama kuna upungufu wa chakula au njaa, utakipata wapi na kwa nani ?

Utakipata kwa: _____

Kwa nani: _____

(67) Tafadhali tueleze ni mazao gani unayostawisha/ulikuwa unastawisha kama akiba ya chakula ? (taja mazao yote)

(i) Katika kijiji hiki: _____

(ii) Katika kijiji ulichohama: _____

(iii) Kwa nini umechagua kustawisha mazao haya kama akiba ?

(68) Ni matatizo gani (ya msingi) yanayosababisha ushindwe kupata chakula kuitosha familia yako katika kijiji hiki na mahali ulichohama ?

(i) Katika Kijiji hiki: _____

(ii) Katika kijiji ulichohama: _____

(69a) Tafadhali tueleze familia yako inapataje kipato chake ? (zingushia jibu sahihi)

(i) Mauzo ya: mavuno, mifugo, bidhaa zitokanazo na mifugo

mawindo, bidhaa zilizokusanywa, pombe, mbao

mkaa, matofali, asali, (vingine)

(ii) Ajira: kazi ndogondogo, ajira za msimu, ajira ya kudumu

(iii) Vingine: kupelekewa pesa, rasilimali, biashara, zawadi

sadaka, malipo ya uzeeni baada ya kustaafu

b) Je, familia yako ilikuwa inapataje kipato chake huko ulikohama ?
(taja njia zote)

(70a) Tafadhali tueleze kama unaweza kupata kipato kinachotosheleza mahitaji ya familia yako ? (zungushia jibu sahihi)

(i) ni zaidi ya kinachohitajika (ii) ni cha kutosha

(iii) ni kidogo kuliko kinachohitajika (iv) hakuna jibu

b) Utakadiriaje kipato chako cha sasa kulinganisha na cha kule ulikokuwa unaishi ?

(i) kikubwa zaidi (ii) kikubwa (iii) ni kama kinalingana

(iv) kidogo (v) kidogo zaidi (vi) hakuna jibu

(71) Je, ulihama kutoka ulikokuwa unaishi kwa sababu ya ukosefu wa chakula na/au kipato ?

(i) ukosefu wa chakula (ii) ukosefu wa kipato

(iii) kwa sababu nyingine (taja): _____

(72a) Ni shughuli/miradi gani ungefikiri kufanya ili kujiongezea chakula na kipato ?

(i) kujiongezea chakula: _____

(ii) kujiongezea kipato: _____

b) Ni katika ngazi gani ongezeko la chakula linatakiwa kutafutwa ?

familia, jamaa, marafiki, kijiji, wilaya, mkoa, taifa

c) Ni katika ngazi gani msaada unatakiwa kutolewa ili kuongeza uhakika wa chakula?

mtuu pekee, familia, jamaa, marafiki, kijiji, wilaya, mkoa, taifa

(nyingineyo): _____

d) Ni katika ngazi gani ongezeko la kipato linatakiwa kutafutwa ?

mtuu pekee, familia, jamaa, marafiki, kijiji, ushirika

wilaya, mkoa, taifa

e) Ni katika ngazi gani msaada unatakiwa kutolewa ili kuongeza kipato ?

mtuu pekee, familia, jamaa, marafiki, kijiji, ushirika

wilaya, mkoa, taifa, (nyingineyo): _____

(73) Tafadhali tueleze kama ungeweza kuhama kijiji hiki kwa sababu zifuatazo ?
(weka vema kuonyesha jibu sahihi)

SABABU	Hapana	Ndiyo	Labda	Sijui
ukosefu wa chakula				
ukosefu wa kipato				
ukosefu wa eneo ya kulima				
ukosefu wa malisho				
ukosefu wa maji				
ukosefu wa kuni/miti				
ukosefu wa usalama				
kuongezo chakula				
kuongeza kipato				
kuongeza ardhi				
kuongeza malisho				
kuongeza maji				
kuongeza kuni/miti				
kuongeza usalama				
kuongeza mavuno				

Kwa sababu nyingine: _____

(M) MALAZI, MATUMIZI YA FAMILIA NA UHAMIAJI

(74a) Tafadhali tueleze ni nini tabia ya nyumba yako ?

Paa imetengenezwa kwa: _____ Kuta: _____

Idadi ya vyumba: _____ Una chumba cha watoto ? _____

Una: jiko, choo, ghala, banda la mifugo

b) Nyumbani mwako ulikohama kulikuwa na tabia gani ?

Paa ilitengenezwa kwa: _____ Kuta: _____

Idadi ya vyumba: _____ Kulikuwa na chumba ya watoto ? _____

Kulikuwa na: jiko, choo, ghala, banda la mifugo

(75) Tafadhali tueleze utakadiriaje ubora wa nyumba yako sasa ukilinganisha na kule ulikohama ? (zungushia jibu sahihi)

(i) nzuri zaidi sana (ii) nzuri zaidi (iii) zinalingana

(iv) mbaya zaidi (v) mbaya zaidi sana (vi) sijui

(76) Ni vyombo vya aina gani ulivyonavyo kwa matumizi ya familia yako hapa na mahali ulipohama ? (weka vema kuonyesha jibu)

VYOMBO	Nyumba ya sasa	Mahali pa zamani
Meza		
Viti		
MabENCHI		
Kigoda		
Sufuria		
Sahani/bakuli		
Visu/vijiko		

Ndoo/masinia		
Magodoro/vitanda		
Taa/karabai		
Plau		
Shoka		
Baiskeli		
Mikokoteni		
Redio		

(77) Unatumia/ulikuwa unatumia nini kwa kupikia na kuwashia nyumbani kwako ?

(i) Nyumbani kwa sasa: kwa kupikia _____ kwa kuwashia _____

(ii) Nyumbani pa zamani: kwa kupikia _____ kwa kuwashia _____

(78a) Tafadhali tueleze unapata wapi mahitaji yafuatayo ?

MAHITAJI	KUTOKA	UMBALI	GHARAMA
Maji			
Kuni			
Nyasi za kuelekea			
Vifaa vya kilimo			
Nguo			
Madawa			

b) Je, ulikuwa unapata wapi mahitaji yafuatayo katika kijiji ulichohama ?

MAHITAJI	KUTOKA	UMBALI	GHARAMA
Maji			
Kuni			
Nyasi za kuelekea			
Vifaa vya kilimo			
Nguo			
Madawa			

(79a) Tafadhali tueleze ni aina gani ya vifaa vya kilimo unayo na ulikuwa unamiliki kwa matumizi yako ?

(i) Nyumbani kwa sasa: _____

(ii) Nyumbani pa zamani: _____

b) Je, unaazima au ulikuwa unaazima au kukodisha vifaa vyovyote vya kilimo kwa matumizi yako ?

(i) Makazi ya sasa: kuazima _____ kutoka _____

kukodisha _____ kutoka _____ gharama _____

(ii) Makazi ya zamani: kuazima _____ kutoka _____

kukodisha _____ kutoka _____ gharama _____

(N) UHUSIANO KATI BINADAMU NA WANYAMAPORI NA UHAMIAJI

(80a) Tafadhali tueleze aina gani ya wanyamapori ambao huwa unawaona katika kijiji hiki au eneo hili ?

(i) Aina ya wanyamapori: _____

(ii) Unawaona:

kijijini, pembeni mwa kijiji, kijiji cha karibu

hifadhi ya misitu, hifadhi ya wanyamapori

(iii) Lini: mwaka mzima; vuli; kati ya vuli na masika; masika; kiangazi

(iv) Mara ya kuonekana: nyingi sana; nyingi; chache; chache sana; hakuna

b) Ni aina gani ya wanyamapori uliokuwa unawaona katika kijiji au eneo ulilohama ?

(i) Aina ya wanyamapori: _____

(ii) Uliwaona:

kijijini, pembeni mwa kijiji, kijiji cha karibu

hifadhi ya misitu, hifadhi ya wanyamapori

(iii) Lini: mwaka mzima; vuli; kati ya vuli na masika; masika; kiangazi

(iv) Mara ya kuonekana: nyingi sana; nyingi; chache; chache sana; hakuna

(81) Tafadhali tueleze mwelekeo wa idadi ya wanyamapori wanaoonekana sehemu hizo (zungushia jibu sahihi):

(i) imeongezeka sana (ii) imeongezeka (iii) hakuna mabadiliko

(iv) imepungua kidogo (v) imepungua sana

(82) Je, kuna mazao au mifugo yako iliyowahi kushambuliwa na wanyamapori ?

a) Katika kijiji hiki

mara ya kushambuliwa: mara nyingi, mara kwa mara, mara chache

haijawahi kutokea

aina ya mazao/mifugo: _____

Na wanyamapori gani: _____

b) Katika kijiji ulichohama

mara ya kushambuliwa: mara nyingi, mara kwa mara

mara chache, haijawahi kutokea

aina ya mazao/mifugo: _____

Na wanyamapori gani: _____

(83) Tafadhali tueleze kama umewahi kuhamisha nyumba au mashamba yako kwa sababu ya hasara au uharibifu uliosababishwa na wanyamapori ? (zungushia jibu sahihi)

a) Katika kijiji hiki: (i) kuhamisha nyumba (ii) kuhamisha shamba

(iii) kupata hasara lakini nikashindwa kuhama

b) Katika kijiji ulichohama:

(i) kuhamisha nyumba (ii) kuhamisha shamba

(iii) kupata hasara lakini nikashindwa kuhama

c) Je, unawinga au unaamia wanyamapori katika mashamba ?

(i) Sasa: hapana ndiyo (ii) Zamani: hapana ndiyo

(84) Tafadhali tueleze nini mawazo yako kwa hifadhi za wanyamapori ilioko karibu na eneo la kijiji chenu ?

a) kwako/kwa familia: kuna faida; hamna faida au hasara; kuna hasara; sijui

b) kwa wanakijiji: kuna faida; hamna faida au hasara; kuna hasara; sijui

c) kwa Taifa: kuna faida; hamna faida au hasara; kuna hasara; sijui

d) Utakadiriaje hali ya ardhi katika kijiji hiki ukilinganisha na ardhi katika hifadhi ya wanyamapori ?

(85) Tafadhali tueleze kama unataka au ungependa kutumia hifadhi za wanyamapori kwa ajili ya matumizi yafuatayo ? (weka vema kuonyesha jibu kama ni 'ndiyo')

MATUMIZI	SERENGETI	GRUMETI	MASWA
Kulimia			
Kufugia mifugo			

Kuokotea vyakula			
Kufugia nyuki			
Kukatia miti			
Kuwindia wanyama			
Kutembelea kitali			

(O) MABADILIKO YA IDADI YA WATU, RASILIMALI NA MAENDELEO

(86a) Utaoneyeshaje mwelekeo wa idadi ya watu katika kijiji hiki na kijiji ulichokuwa unaishi ? (zungushia jibu sahihi)

(i) Katika kijiji hiki: ongezeko la haraka; ongezeko la taratibu

hakuna mabadiliko; upungufu wa taratibu

upungufu wa haraka; sikumbuki/sijui

(ii) Katika kijiji ulichohama: ongezeko la haraka; ongezeko la

taratibu; hakuna mabadiliko

upungufu wa taratibu; upungufu wa

haraka; sikumbuki/sijui

b) Tafadhali tueleze mwelekeo wa idadi ya wahamiaji/wahamaji katika kijiji hiki na kijiji ulichohama : (taja miaka za mwelekeo sahihi ikiwezekana)

(i) Kijiji hiki: uhamiaji wa haraka; uhamiaji wa taratibu;

hakuna uhamiaji; hakuna uhamaji;

uhamaji wa taratibu; uhamaji wa haraka;

sikumbuki/sijui

(ii) Kijiji ulichohama: uhamiaji wa haraka; uhamiaji wa taratibu; hakuna uhamiaji;

hakuna uhamaji; uhamaji wa taratibu;

uhamaji wa haraka; sikumbuki/sijui

c) Unafikiri mwelekeo wa idadi ya watu kijijini utakuwaje miaka ijayo ?

uongezekaji wa haraka; uongezekaji wa taratibu; haitakuwa

mabadiliko; upunguaji wa taratibu; upunguaji wa haraka;

ni vigumu kubashiri

(87) Utakadiriaje upatikanaji wa rasilimali na huduma zifuatazo kwa idadi ya watu wa kijiji hiki, kijiji ulichohama, na kijiji cha jirani ? (weka vema kuonyesha jibu sahihi)

a) Kijiji hiki

Mahitaji	Nyingi	Inatosha	Haitoshi	Upungufu
Ardhi				
Malisho				
Maji				
Miti				
Shule				
Zahanati				
Chakula				
Mabarabara				

b) Kijiji ulichohama

Mahitaji	Nyingi	Inatosha	Haitoshi	Upungufu
Ardhi				
Malisho				
Maji				
Miti				
Shule				
Zahanati				
Chakula				
Mabarabara				

c) Kijiji cha jirani

Mahitaji	Nyingi	Inatosha	Haitoshi	Upungufu
Ardhi				
Malisho				
Maji				
Miti				
Shule				
Zahanati				
Chakula				
Mabarabara				

(88) Utakadiriaje jumla ya watu na mifugo katika sehemu zifuatazo ?
(tumia kanuni kuandika jibu sahihi)

KANUNI: 1=wengi sana 2=wengi 3=ya kutosha 4=wachache 5=wachache sana
6=sijui

MAHALI/ENEO	Idadi ya watu	Idadi ya mifugo
Kijiji ulichohama		
Kijiji hiki		
Kijiji cha jirani		
Katani		
Wilayani		
Mkoani		

(89) Utakadiriaje upatikanaji wa rasilimali na huduma za jamii ukizingatia ongezeko au upungufu wa idadi ya watu katika kijiji hiki, vijiji vya jirani, kwenya kata na wilaya?
(tumia kanuni kuandika jibu sahihi)

KANUNI: 4=zaidi ya kutosha 3=ya kutosha 2=haitoshi
1=upungufu mkubwa 0=sijui/nashindwa kukadiria

a) Kijiji Hiki

Idadi ya watu	Ardhi	Malisho	Maji	Miti	Huduma za jamii
Ongezeko la haraka					
Hakuna mabadiliko					
Upungufu wa haraka					

b) Vijiji vya jirani

Idadi ya watu	Ardhi	Malisho	Maji	Miti	Huduma za jamii
Ongezeko la haraka					
Hakuna mabadiliko					
Upungufu wa haraka					

c) Katani au Wilayani (taja eneo sahihi)

Idadi ya watu	Ardhi	Malisho	Maji	Miti	Huduma za jamii
Ongezeko la haraka					
Hakuna mabadiliko					
Upungufu wa haraka					

(90) Tafadhali tueleze ni mambo gani ungefikiri kuwa ni mahitaji muhimu kwako ?
(zungushia jibu sahihi)

(i) eneo ya kulima (ii) eneo kubwa zaidi ya kulima

(iii) eneo lenye rutuba zaidi (iv) eneo zaidi la kufuga

(v) eneo lenye malisho mazuri zaidi (vi) eneo lenye miti/kuni zaidi

(vii) utipatikanaji wa maji mazuri

(viii) upatikanaji wa huduma za jamii (taja huduma)

(ix) usalama zaidi (x) uzuviaji wa uharibifu wa wanyamapori

(xi) upatikanaji wa pembejeo na vifaa vya kilimo

(xii) Nyinginezo: _____

(91) Utakadiriaje mwelekeo wa maendeleo katika kijiji hiki kwa vipindi vifuatavyo ?
(weka vema kuonyesha jibu)

Mwelekeo	Kwa Haraka	Kwa Taratibu	Hakuna Mabadiliko	Imepungua
Tangu 1988				
Tangu 1985				
Tangu 1980				
Tangu 1974				
Tangu 1961				

(92a) Tafadhali tueleze unafikiriaje kiwango cha maendeleo katika kijiji hiki ukilinganisha
na kijiji ulichohama ? (zungushia jibu sahihi)

(i) ni juu zaidi sana (ii) ni juu zaidi (iii) hakuna tofauti

(iv) ni chini zaidi (v) ni chini zaidi sana (vi) sijui

b) Vijiji hivi vinatofautianaje kimaendeleo ? Tafadhali eleza.

(93) Utakadiriaje mwenyewe kulinganisha na wanakijiji walio wengi kwenye mambo yafuatayo ? (weka vema kuonyesha jibu sahihi)

a) Katika kijiji hiki

Hali yako	Ardhi ukubwa	Ardhi rutuba	Umiliki mifugo	Chakula	Malazi	Kipato
Nzuri zaidi sana						
Nzuri zaidi						
Hakuna tofauti						
Mbaya zaidi						
Mbaya zaidi sana						
Sijui						

b) Kijiji ulichohama

Hali yako	Ardhi ukubwa	Ardhi rutuba	Umiliki mifugo	Chakula	Malazi	Kipato
Nzuri zaidi sana						
Nzuri zaidi						
Hakuna tofauti						
Mbaya zaidi						
Mbaya zaidi sana						
Sijui						

c) Vijiji vya jirani

Hali yako	Ardhi ukubwa	Ardhi rutuba	Umiliki mifugo	Chakula	Malazi	Kipato
Nzuri zaidi sana						
Nzuri zaidi						
Hakuna tofauti						
Mbaya zaidi						
Mbaya zaidi sana						
Sijui						

(Mhojaji, kumbuka kumshukuru mhojiwa kwa uhushirikiano, muda na ukarimu wake na wanafamilia wake. Kama hukumaliza kumhoji, tafadhali fanya mipango wa siku, muda na mahali pa kumhoji tena. Andika mipango hiki katika ukurasa wa kwanza.)

Appendix IIc

RURAL-RURAL MIGRATION IN SERENGETI DISTRICT: HOUSEHOLD QUESTIONNAIRE

VILLAGE: _____ WARD: _____

Cell No.: _____ No. of Households in Cell: _____

Household No.: _____ Respondent: _____

INSTRUCTIONS FOR THE INTERVIEWER

- 1) Explain to the respondent the aim of the research and the purposes of these questions.
- 2) Assure the respondent that all the answers are confidential. There is no compulsion for the respondent to answer any questions but his/her cooperation in this research is sought and is greatly appreciated.
- 3) Ask each question separately and clearly. Allow the respondent adequate time to think and answer. Do not hasten or assist/prompt the respondent.
- 4) Write the answer to each question clearly in the appropriate place. You can circle or put a tick depending on the response among the list of the answers provided. If necessary, add any answers not listed in the answers provided.
- 5) Ensure that each question on every page has been asked. If the space is inadequate, write the rest of the response at the back of the page. Note the question number for the answer.
- 6) Do not tell/discuss the answers of any respondent with the person answering your questions or any other person.
- 7) Thank the respondent for his/her time, cooperation and hospitality.
- 8) If you were unable to complete the interview, make an arrangement to complete it. Indicate if the interview was completed or not.

INTERVIEW: **completed** **not completed**

Alternate time to complete: _____ (day) _____ (time)

**RURAL MIGRATION IN THE SERENGETI DISTRICT: HOUSEHOLD
QUESTIONNAIRE**

(A) INFORMATION ABOUT THE RESPONDENT AND FAMILY/HOUSEHOLD

(1a) Please tell us if the respondent is the head of the family/household ?

YES NO

Respondent is male/female: _____ Age: _____ (years)

Occupation: _____

b) if not, the head of the family/household is:

Sex: _____ Age: _____ (years) Occupation: _____

c) The head of the family/household lives in ?

(i) this homestead (ii) another homestead in the village

(iii) another village (iv) another town (v) another country

Name of the village/town/country

Occupation: _____

(2) How many persons live in this family or homestead ?

No. of people: _____ (total)

No. of elderly: adults children (< 18 years)

(3) Which languages are spoken in the family ?

Names of languages: _____

Which languages can be written and read ?

Names of Languages:

(4) Please tell us about the members of the family :

CODES:

Person=elder/adult/child relationship to HH=head of household

(1st wife, 2nd child, etc.) Sex=male/female Age=(years)

Read and Write= Yes/No Std.= (note standard) Dk=Don't know

Information about the family:

No.	Person	Sex	Age	Occupation	Read/Write	Std.
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

(5) When did you and your family start residing in this village ?

(circle the appropriate response)

(i) since birth (ii) before Uhuru/independence (1961) (iii) after Uhuru

(iv) before villagization/Ujamaa (1973-74) (v) after villagization

(vi) since 1978 census (vii) since 1985 elections (viii) since 1988 census

(ix) since last year's wet season (Nov 1989-May 1990)

(x) since last year's dry season (June 1990-Oct 1990)

(xi) since last wet season (Nov 1990-May 1991)

(xii) since (month/year) (xiii) don't know

(B) PLACE OF BIRTH, RESIDENCE AND MIGRATION

(6) Where were you and members of your family born, and residing during the following periods ? (Interviewer, please note the actual years if possible about birth, residence, and migration)

No.	Sex	Age	Birth Place	Before Uhuru	After Uhuru	Before Ujamaa	After Ujamaa
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

No.	Census 1978	Election 1985	Census 1988	Wet Season 1989-90	Dry Season 1990-91	Wet Season 1991
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

(Interviewer, if the space is inadequate note the information about the rest of the household at the back of the page)

C) MARRIAGE, CHILDREN AND MIGRATION

(7) Is there anyone who migrated because of marriage ?

(i) No (ii) Yes

If Yes, (note); Sex: Age: When ?

Moved to ? _____ (village/ward/town)

(8) Are there any children that were born in the village where the parents of the mother reside ?

(i) No (ii) Yes

If Yes, (note):

	Sex	Age	Birth Place	When (year)
1.	_____		_____	
2.	_____		_____	
3.	_____		_____	

(D) EDUCATION, EMPLOYMENT AND MIGRATION

(9) Please tell us if anyone in your family has gone for education or training outside the village ?

(i) No (ii) Yes (iii) Planning to go

If Yes or planning to go, (note):

	Sex	Age	Where ?	When ?	Standard/Training
1.	_____		_____		_____
2.	_____		_____		_____

(10) Is there anyone in this homestead that moved to this village for education or training?

(i) No (ii) Yes

If Yes, (note):

	Sex	Age	From ?	When ?	Standard/Training
1.	_____		_____		_____
2.	_____		_____		_____

(11) Please tell us if there is anyone who has gone/been to work outside this village ?

a) (i) No (ii) Yes (iii) Planning to go (iv) Had been and returned

b) If Yes, planning to go, or had been and returned, (note):

Sex	Age	Where ?	When ?	Type of Work ?	Return ?
_____		_____		_____	
_____		_____		_____	

(12a) Please tell us if you receive or received any assistance (from them) while they were working elsewhere ? (circle appropriate response)

(i) No Yes

(ii) If Yes, what type of assistance ?

cash clothes medicines food household utensils building tools

farm tools radio bicycle farm inputs corrugated sheets wood

advice education expertise Other: _____

(iii) Note specific type of advice or expertise:

b) Did the family assist in anyway while they were working elsewhere ?

(i) No Yes

(ii) If Yes, how ? food livestock cash labour firewood/charcoal wood

medicine advice _____

(13) Please tell us if there is anyone in this family who has come from somewhere else to live, cultivate or work in this village ?

No Yes

If Yes, (note): Sex Age From ? When ? Work ?

(E) MIGRATION AND RESONS FOR MOVING

(14) If you in-migrated into this village from another village or place, when did you move and from where ?

From village/place: _____

ward: _____ When ? _____

(15) Why did you migrate from the village or place you were living in ?

(i) To obtain: land to cultivate, more land to cultivate,

more fertile land, more pasture, better pasture

wood to build, firewood, more rainfall, more water

better water

(ii) For : school, clinic, market, shops, transportation, government offices
agricultural extension, veterinary services

(iii) To get closer to: school, clinic, market, shops, transportation,
town, park, main road

(iv) Villagization (1973-74), rural development

(v) Banditry, stock rustling, witchcraft, strife

(vi) To inherit: land, livestock, business, homestead

(vii) Marriage, separation, divorce, widowhood

(viii) To care for parents, to join family or friends

(ix) Death in the family, death of livestock

(x) Disagreement: in the family, with friends,
with neighbours, with village leaders

(xi) Work, business, sell produce, job transfer

(xii) Because of: flood, drought, fires, erosion, earthquake
livestock diseases, plant/crop diseases, human diseases
population pressure, wildlife damage

Other reasons _____

(16) Please tell us why you decided to migrate into this village ?
(circle the appropriate response)

a) Because of the availability of:

(i) more land to cultivate (ii) more fertile land

(iii) more pasture land (iv) better pastures (v) more water

(vi) better water (vii) more firewood (viii) more building wood

(ix) more rainfall (x) more reliable rainfall

b) Because of the availability of services:

(i) school (ii) clinic (iii) market(s) (iv) shops (v) transportation

(vi) agricultural extension (vii) veterinary (viii) crop purchasing agency

(ix) development bank (x) work or employment

c) Because it is nearer to:

(i) school (ii) clinic (iii) market(s) (iv) shops (v) transportation

(vi) extension services (Agric./Veterinary) (viii) crop purchasing agency

(ix) town/city (x) mosque, church, etc. (xi) government offices

d) Because of: (i) villagization (ii) more security

(iii) job transfer (iv) business (v) inheritance

e) Because there is/are:

(i) friends (ii) family (iii) relatives/kin (iv) clan/tribe

(v) leaders who are friends (vi) village acquaintances

(vii) better leadership (viii) no or little strife (ix) better climate/environment

f) Because there is no or little risk of:

(i) fire (ii) flood (iii) drought (iv) banditry/theft

(v) wildlife damage (vi) human diseases (malaria, bilharzia, measles, etc.)

(vii) livestock diseases (anthrax, rinderpest, etc.)

(viii) crop diseases/pests (locusts, army worms, etc.)

(ix) soil erosion (x) earthquake/slumping

g) For a change of climate/environment

h) No particular reason Don't know

(17) Did you get or obtain the need that you came to this village for ?

(i) No Yes

(ii) If Yes, which need(s) did you obtain ?

(iii) If No, which need did you not obtain ?

Why ? _____

(18) Please tell us if all members of your family moved here or whether others remained or moved to some other place ?

a) all moved here some remained some moved elsewhere

b) If some remained, explain who did so and why ?

(i) Remained: _____

(ii) Why ? _____

c) If some went elsewhere, please explain:

(i) Who ? _____

(ii) Where did they go ? _____

(iii) Why ? _____

(19) Which other place(s) did you consider to move to in addition to this village ?

(i) place/village/town _____

(ii) Why ? _____

(iii) Why did you decide not to go to those places ?

(20a) Please tell us how you and your family moved here:

(i) Father moved here first and the rest followed later

(period) _____ (days/weeks/months/years)

(ii) Mother/wife moved here first and the rest followed later

(period) _____ (days/weeks/months/years)

(iii) Son/daughter moved here first and the rest followed later

(period) _____ (days/weeks/months/years)

(iv) All moved here together

(v) Other ways: _____

b) Did you migrate here directly or did you stay in some place for a while ?

(i) migrated directly (ii) stayed in some place for a while

If you stayed in some place, where ? _____

For how long ? _____ Why ? _____

c) Did you hire any transportation or get any assistance while migrating ?

(i) No Yes

(ii) If Yes, please explain: _____

(21a) Did you build or buy or rent a homestead in this village before moving here ?

(i) No (ii) built (iii) bought (iv) rented (v) inherited

(vi) lived with relatives/friends/clansmen

b) Did you clear, buy, or cultivate a shamba in this village before migrating here ?

(i) No (ii) cleared shamba (iii) bought shamba (iv) rented shamba (v) inherited

(vi) shared the shamba of family/relative/friend (vii) used village shamba

(22) Please tell us if you were assisted by anyone in this village to build your home, to clear or cultivate your shamba ?

No Yes

(i) If not, (note) who:

built the home ? _____ cleared the shamba ? _____

cultivated the shamba ? _____

(ii) If Yes, whose assistance did you get ? (circle the appropriate responses)

family only relatives friends villagers co-religionists labourers

(iii) What kind of assistance ? to build home to clear shamba farm implements

oxen farm inputs to cultivate shamba

(22) Please tell us how you learnt about the situation in this village ?

- From: (i) a short visit to the village (ii) several visits to this village
(iii) having previously worked in this village (iv) family living here
(v) friends living here (vi) leader in this village (vi) market here
(vii) family and/or friends living in village of out-migration
(viii) leader in village of out-migration
(ix) market in out-migrated village (x) radio broadcasts (xi) newspapers
(xii) Government bulletin/orders (xiii) Don't recollect/know

(F) RESOURCES AND SERVICES IN THE AREA OF OUT-MIGRATION

(23) How would you rate the availability and quality of resources that were in the area you moved from ? (place ticks to indicate the response)

Average (*) = Neither satisfactory nor unsatisfactory

	rain	land	fertility	water	pasture	wood
Very Satisfactory						
Satisfactory						
Average (*)						
Unsatisfactory						
Very Unsatisfactory						
Can't recall						

(24a) Please tell us what types of social services did you get in the village you moved from ? (circle the appropriate responses)

school clinic transportation market shops piped water well-water
police inoculations family planning improved life education

b) Which kinds of social services were you getting from outside your village (e.g. from nearby village/town) ?

school clinic transportation market shops piped water well-water

police inoculations _____

c) How would you rate the social services in the area that you moved from ?

Average (*) = Neither satisfactory nor unsatisfactory

	school	clinic	market	transport	shops	security
Very Satisfactory						
Satisfactory						
Average (*)						
Unsatisfactory						
Very Unsatisfactory						
Can't Recall						

How would you rate the leadership in the village that you moved from ?

(25a) Please tell us the agricultural services that you could get in the village that you moved from: (circle the appropriate responses)

hybrid seeds, fertilizer, pesticides, hoes, machetes, axes, ox-plough

tractor, carts, ox-cart, pick-up, lorries, bus, crop store

agricultural extension, veterinary services, tree seedlings, fruit seedlings

livestock auction

b) What kinds of agricultural services did you get from outside the village that you moved from ?

c) How would you rate the agricultural services in the area that you moved from ?
(place a tick to indicate response or use satisfaction scale)

Average (*) = Neither satisfactory nor unsatisfactory

	tools	inputs	storage	marketing	prices
Very Satisfactory					
Satisfactory					
Average (*)					
Unsatisfactory					
Very Unsatisfactory					
Can't Recall					

How would you rate the transportation services for crops ? _____

agricultural extension ? _____

d) How would you rate veterinary services in the area that you moved from ?

(i) availability of drugs:(ii) expertise:

(iii) auction: livestock prices:

(iv) disease prevention:

(26a) How would you rate the environmental risks in the area that you moved from ?

Risk	drought	fire	wildlife damage	erosion	floods
Very High					
High					
Average (*)					
Low					
Very Low					
Don't know					

Risk	Diseases			hunger famine	lack of pasture
	human	stock	crop		
Very High					
High					
Average (*)					
Low					
Very Low					
Don't know					

Average (*)= Neither high nor low

b) How would you rate the risk of deforestation ? _____

(G) RESOURCES AND SERVICES IN THE AREA OF RESIDENCE

(27) How would you rate the availability and quality of resources in this village ?
(place ticks to indicate response)

	rain	land	fertility	water	pasture	wood
Very Satisfactory						
Satisfactory						
Average (*)						
Unsatisfactory						
Very Unsatisfactory						
Can't recall						

(28a) Please tell us about the social services that you can get in this village:
(circle the appropriate responses)

school, clinic, transportation, market, shops, piped water, well-water

police, inoculations, family/improved life planning

b) Please tell us the social services that you obtain from outside and are not available in this village:

c) How would you rate the social services in this village ?

	school	clinic	market	transport	shops	security
Very Satisfactory						
Satisfactory						
Average (*)						
Unsatisfactory						
Very Unsatisfactory						
Can't Recall						

How would you rate the leadership in the village ? _____

(29a) Please tell us the agricultural services you get in this village:
(circle the appropriate responses)

hybrid seeds, fertilizer, pesticides, hoes, machetes, axes, ox-plough

tractor, carts, ox-cart, pick-up, lorries, bus, crop store, agricultural extension

veterinary services, tree seedlings, fruit seedlings, livestock auction

b) How would you rate the veterinary services in this village ?
(Interviewer, use services satisfaction scale)

(i) availability of drugs:

(ii) availability/quality of dip:

(iii) inoculations:

(iv) veterinary expertise:

(v) disease prevention:

c) How would you rate agricultural services in this village ?

	tools	inputs	storage	marketing	prices
Very Satisfactory					
Satisfactory					
Average (*)					
Unsatisfactory					
Very Unsatisfactory					
Can't Recall					

Average (*)= Neither satisfactory nor unsatisfactory

How would you rate the transportation services for crops ? _____

agricultural extension ? _____

(30) How would you rate the environmental risks in this village ?

Risk	drought	fire	wildlife damage	erosion	floods
Very High					
High					
Average (*)					
Low					
Very Low					
Don't know					

Average (*)= Neither high nor low

Risk	Diseases			hunger famine	lack of pasture
	human	stock	crop		
Very High					
High					
Average (*)					
Low					
Very Low					
Don't know					

(31) How would you compare, on the following, this village with the place that you moved from ? (place tick to indicate response)

Item/ Service	Very much better	Better	Same	Worse	Very much worse	Don't know
Land						
Fertility						
Pastures						
Security						
Rainfall						
Water						
Wood						
School						
Clinic						
Transport						
Farm inputs						
Farm tools						
Crop market						
Auction						
Shops/goods						
Extension						
Leadership						
Farm input prices						
Tool prices						
Transport costs						
Goods prices						
Crop prices						
Medicine costs						
Family's Health						
Livestock Health						
Environment						

(32) How would you compare the overall quality of life in this village with the place that you moved from ?

Place	Very much better	Better	Same	Worse	Very much worse	Don't know
Moved from						
This village						
Neighbouring villages						
Nearby town						
Other District villages						
Other Regional villages						

(H) POTENTIAL MIGRATION

(33a) Have you been to visit the place you moved from ?
(circle the appropriate response)

(i) No (ii) Yes

If not, why ? _____

If Yes, how often ? _____

Why ? _____

b) Do you intend to go and live there again ?

(i) No (ii) Yes (iii) Maybe

If not, why ? _____

If yes/maybe, why ? _____

c) Do you think that it was wise for you to move from the place that you used to live in ?

Yes No Don't know

Do you think it was wise for you to move here or not ?

Yes No Don't know

(34a) Have you thought about moving from this village to live in another place ?

No Yes

If not, why ? _____

If yes, where to ? (place a tick to indicate answer)

(i) another location within this village (ii) outside this village

(iii) another village (note name) _____

(iv) another ward (note name) _____

(v) town/city (note name) _____

(vi) other region or country (note name) _____

b) How often have you thought about moving from this village ?

(i) very few times (ii) few times (iii) many times

(iv) very many times (v) have considered but not decided

(vi) have decided to move (vii) am migrating

c) Have you visited the place that you intend to migrate to ?

(i) No Yes

(ii) If yes, how many times have you visited ? _____

for how long ? _____ (days/weeks/months)

why ? _____

d) Do you think you will have a better life there ?

(i) No Yes Can't say

(ii) If not, why ? _____

(iii) If yes, why ? _____

(iv) If you can't say, why ? _____

e) (i) Did you alone decide/arrange to move or did you discuss it with your family, relatives, mates/friends, etc. ?

Decided/arranged: alone with family with relatives

with friends with elders with village leaders

(ii) Since how long have you considered to migrate ?

Since: _____ (days/weeks/months/years)

Frequency: few times sometimes many times

(D) SOCIAL RELATIONS, ASSISTANCE AND MIGRATION

(35a) Are there family, relatives, friends or anyone else whom you give and/or receive assistance from in this village ?

(Interviewer, note yes/no and the type of assistance)

Assistance	Family	Relative	Friends	Villagers
No/Yes				
Assistance given				
Assistance taken				

b) Did you give and/or receive any assistance from family, relatives, etc., in the village you lived in previously ?

Assistance	Family	Relative	Friends	Villagers
No/Yes				
Assistance given				
Assistance taken				

(36a) Which community activities do you and your family participate in with other villagers ? (circle the appropriate responses)

- (i) village farm (ii) to build/repair (iii) security (iv) education
 (v) health (vi) control wildlife damage (vii) ujamaa activities (viii) sports
 (ix) advisory (x) water distribution (other): _____

b) Did you also do the same in the viillage that you moved from ?

(i) No Yes

(ii) If yes, which activities ? _____

(37a) How often do you participate in the village activities ?

- daily, 3 times a week, once a week, once a fortnight
 once a month, once in 3 months, once every 6 months
 once a year, whenever asked/informed, do not participate

b) How often did you participate in community activities in the place that you moved from ?

(note how often): _____

(38a) Please tell us if you have any position of leadership within the village ?

(i) No Yes

(ii) If yes, what type of position ? _____

Since when ? _____

For how long ? _____

b) Did you have any position of leadership in the village that you migrated from ?

(i) No Yes

(ii) If yes, what type of position ? _____

For how long ? _____

(39a) Please tell us if there is any village, government, organization, etc., that assists you with your needs in this village ?

(i) No Yes

(ii) If yes, state the name of organization, etc. _____

type of assistance _____

b) Was there a village, government, organization, etc., that used to assist you with your needs in the village that you migrated from ?

(i) No Yes

(ii) If yes, state the name of organization, etc. _____

type of assistance _____

(40a) Please tell us if you cultivate, herd, build, maintain your homestead, etc., with assistance from anyone ?

(i) No Yes

(ii) If yes, who assists ? _____

where are they from ? _____

(iii) Do you pay for such assistance ? No Yes

If yes, the payment is: in cash, livestock, crops

food/liquor, reciprocal exchange, other cooperation

b) Did you cultivate, herd, etc., with assistance from anyone in the place that you moved from ?

(i) No Yes

(ii) If yes, who assisted you ? _____

where were they from ? _____

how did you pay for such help ? _____

(41) Please tell us from whom you would seek or from whom you had sought help to obtain the following needs ? (use the codes to note the responses)

Needs	In this Village	In village you moved from
Land		
Oxen		
Loan		
Workers		
Farm tools		
Farm inputs		
Storage		
Transportion (crops)		
Food/clothes		
Other		

CODES: 1=family 2=relatives 3=clan/tribe 4=friends
5=neighbours 6=village leaders 7=villagers
8=mosque/church/co-religionists 9=government

(42) How would you rate your relations with relatives, friends, etc., in this village ?
(place a tick to indicate appropriate response)

	family	relatives	neighbours	friends
Very Satisfactory				
Satisfactory				
Average (*)				
Unsatisfactory				
Very Unsatisfactory				

Average (*) = Neither satisfactory nor unsatisfactory

How would you rate your relations with:

(i) village leaders ? _____

(ii) villagers ? _____

(43a) Please tell us if you would consider moving somewhere else within this village or outside so that you may have better social relations ? (circle the appropriate response)

(i) within this village (ii) outside the village (iii) another village

(iv) district HQ (v) town (vi) not sure (vii) no desire/not moving

b) If you did consider moving, would you move alone, or with a part of your family, or with the whole family ?

(i) alone, with part of family, with whole family

(ii) If you alone, why ? _____

(iii) If part of the family, who would remain ?

_____ Why ? _____

(44) How would you rate your relations with the family, relatives, etc., in the village that you used to live ? (place a tick to indicate the appropriate response)

	family	relatives	neighbours	friends
Very Satisfactory				
Satisfactory				
Average (*)				
Unsatisfactory				
Very Unsatisfactory				
Can't recall				

Average (*)= Neither satisfactory nor unsatisfactory

How would you rate your relations with the leaders of the village that you migrated from ?

How would you rate the relations with the villagers that you migrated from ?

(45) How do your social relations in this village compare with those in the place that you moved from ?

Relations with	Very much Better	Better	Same	Worse	Very much Worse	Don't know
Family						
Relatives						
Friends						
Neighbours						
Leaders						
Villagers						

(46) Please tell us if you moved from where you were living before because of disagreement ?

- (i) within family (ii) with relative (iii) with neighbour (iv) with villagers
- (v) with village leaders (vi) with religious leaders (vii) with government employee
- (viii) with others

(J) LAND USE, AGRICULTURAL PRACTICES, AND MIGRATION

(47) Please tell us the characteristics and practices in your shambas:
(Interviewer, if the answer is 'yes' place a tick; or use codes)

CODES: Catena location: A=ridge top B=upper slope C=mid slope

D=lower slope E=mbuga/valley

Soil type: sandy, clay, loam, etc.

Soil colour: red, black, white, khaki, etc.

Method of acquiring shamba: village government, inheritance, etc.

(Question 47; for all households)

Shamba/characteristics	1	2	3	4	5
Size (acres)					
Catena location					
Walking time					
Soil type					
Soil colour					
Fertility					
Crops grown					
Year began using					
Method Acquired					
Tools used					
Manure					
Green manure					
Fertilizer (chemical)					
Kitchen wastes					
Hybrid seeds					
Pesticides					
Inter cropping					
Crop rotation					
Fallowing					
Burn residues					
Plough in residues					
Irrigate					
Mounding/ridging					
Erosion control					
No. of Weedings					
Hire labour					
Control wildlife					
Graze livestock					
Level of harvest					
No. of harvests/year					

(48) Please tell us about the characteristics and practices in your shambas in the village you migrated from: (place ticks and use codes)
(Question 48; for in-migrants only)

Shamba/characteristics	1	2	3	4	5
Size (acres)					
Catena location					
Walking time					
Soil type					
Soil colour					
Fertility					
Crops grown					
Year began using					
Method Acquired					
Tools used					
Manure					
Green manure					
Fertilizer (chemical)					
Kitchen wastes					
Hybrid seeds					
Pesticides					
Inter cropping					
Crop rotation					
Fallowing					
Burn residues					
Plough in residues					
Irrigate					
Mounding/ridging					
Erosion control					
No. of Weedings					
Hire labour					
Control wildlife					
Graze livestock					
Level of harvest					
No. of harvests/year					

(49) Please tell us the situation in your shambas in this village:

Situation	Very Much	Much	Average	Little	Very Little	Don't know
Harvest						
Fertility						
Weeds						
Wildlife/ Insects						
Erosion						
Salinity						
Labour Input						

(50) What have been the trends in your shambas since the 1988 census ?
(place ticks to indicate appropriate response)

Trend	Harvest	Fertility	Weeds	Wildlife /Insects	Labour Input
Very rapid Increase					
Increase					
Same					
Decrease					
Very rapid Decrease					
Don't know					

What are the trends in soil erosion ? _____

in salinity/alkalinity ? _____

(51a) (i) Please tell us who from the family works in your shambas ? (information about each shamba; use codes)

(ii) Which members of the family work the most ?

(iii) Who from the family works in the village shamba ?

b) Are there relatives who assist in the shambas ?

c) Are there people hired ?

How are they paid (paid, given crops) ?

d) Are there people who assist in work and are given food/drink (msaragambo) ?

CODES: Shamba location A) ridgetop B) upper slope
C) mid slope D) lower slope
E) mbuga/valley

Workers (family): 1=father 2=mother 3=child (note actual numbers)

Shamba	1	2	3	4	5	Kijiji
Shamba location						
Family working in shamba						
Family working the most						
Relatives						
Labour (paid)						
Labour (crop)						
Msaragambo						

(52) Please tell us which activities are carried out in the shambas by the following persons and when ? (place tick to indicate the response)

Work/Period	father	mother	children	kin	labour	m'gambo
Clearing						
Hoeing						
Ox-plough						
Mounding						
Sowing						
Weeding						
Manuring						
Irrigate						
Scare vermin						
Harvesting						
Processing crops						
Transport						
Selling						
Buying Inputs						

(53a) Please tell us what was the situation in your shambas in the place that you used to live in ? (place ticks to indicate the responses)

Situation	Very Much	Much	Average	Little	Very Little	Don't know
Harvest						
Fertility						
Weeds						
Wildlife/ Insects						
Erosion						
Salinity						
Labour Input						

b) Please tell us what were the trends in your shambas before you migrated ?

Trend	Harvest	Fertility	Weeds	Wildlife /Insects	Labour Input
Very rapid Increase					
Increase					
Same					
Decrease					
Very rapid Decrease					
Don't know					

What were the trends in soil erosion ? _____ in salinity/alkalinity ?

(54a) (i) Please tell us who from the family used to work in your shambas where you moved from ? (information about every shamba; use the codes)

(ii) Who in the family used to work the most ?

(iii) Who in the family used to work in the village shamba?

b) Was there a relative(s) who used to assist in your shambas ?

c) Did you hire labour ? How were they paid (paid, crop) ?

d) Were there persons who assisted in work and were given food/drink (msaragambo)?

CODES: Shamba location A) ridgetop B) upper slope C) mid slope

D) lower slope E) mbuga/valley

Workers (family): 1=father 2=mother 3=child
(note actual numbers)

Shamba	1	2	3	4	5	Kijiji
Shamba location						
Family working in shamba						
Family working the most						
Relatives						
Labour (paid)						
Labour (crop)						
Msaragambo						

(55) Please tell us what activities did the following persons do in the shambas and when in the place that you moved from ?

Work/Period	father	mother	children	kin	labour	m'gambo
Clearing						
Hoeing						
Ox-plough						
Mounding						
Sowing						
Weeding						
Manuring						
Irrigate						
Scare vermin						
Harvesting						
Processing crops						
Transport						

Who used to sell the crops ? _____

Who used to buy the farm inputs ? _____

(K) LIVESTOCK HUSBANDRY AND MIGRATION

(56a) What kinds of livestock do you have here and used to have where you moved from ? (note the numbers; other livestock)

Cattle Oxen Goats Sheep Donkeys

This Village _____

Village Moved From _____

b) Please tell us if you have given any of your livestock to be cared for by someone else in an area away from the village ?

In This village: No Yes all livestock some of the livestock

If Yes, to whom ? _____ Where ? _____

since when ? _____ Why ? _____

How do you pay for it ? _____

Village you Moved From: No Yes all livestock some livestock

If Yes, to whom ? _____ Where ? _____

since when ? _____ Why ? _____

How did you pay for it ? _____

(57) Where do you obtain water for your livestock during the wet and dry seasons ?

this village Village out-migrated

WET SEASON _____

DRY SEASON: _____

distance to water: _____ (min/hours)

(58a) Please tell us where and what do you feed your livestock in this village ?
(use the codes to note the responses)

Season	Area	Catena location	Type of feed	Avail-ability	Quality	Who owns area ?
Short Rains						
Short-Long						
Long Rains						
Sowing						
Harvesting						
Dry						

b) Where and what did you feed your livestock in the place that you used to live in ? (use the codes to note the responses)

Season	Area	Catena location	Type of feed	Avail-ability	Quality	Who owns area ?
Short Rains						
Short-Long						
Long Rains						
Sowing						
Harvesting						
Dry						

CODES: (a) area 1=within village 2=outside village 3=other village

(b) catena location 1=hill 2=ridgetop 3=slope 4=valley/mbuga

(c) type of feed 1=grass 2=feed crop 3=crop residues

(d) availability of feed 1=plenty 2=enough 3=inadequate 4=shortage/none

(e) quality of feed 5=very good 4=good 3=average 2=poor 1=very poor

(f) area owned by 1=privately 2=friend/neighbour 3=village/communal

4=co-operative 5=forest reserve 6=wildlife park

(59a) Do you grow, purchase, or gather feed for your livestock ?
(circle the appropriate responses)

grow, purchase, gather, herded, range freely

b) Have you hired labour to herd your livestock ?

No Yes If Yes, how many ? _____

For how long ? _____

Form of payment ? _____

(60a) Please tell us if you used to grow, purchase, or gather feed for your livestock in
the place you moved from ?

grew, purchased, gathered, herded, ranged freely

b) Did you hire labour to herd your livestock in the place you moved from ?

No Yes If Yes, how many ? _____

For how long ? _____

Form of payment ? _____

(61) Please tell us what types of diseases have affected your livestock in this village and
where you moved from ?

This village: _____

Village you moved from: _____

(62a) (i) Which types of services do you get for your livestock in this village ?

Types of services: _____

(ii) Which types of services did you get for your livestock in the village that you moved from ?

Types of services: _____

(iii) Where are the services better ?

this village, village you moved from, other places

(note the name of places) _____

(L) FOOD AVAILABILITY, INCOME AND MIGRATION

(63a) Please tell us if you are able to provide for the food requirements of your family ?

No Yes

(i) If Not, why not ? _____

(ii) If yes, why ?

b) Were you able to provide for the food requirements of your family where you used to reside ?

Hapana Ndiyo

(i) If Not, why not ? _____

(ii) If yes, why ?

.....

(64a) In which of the following ways do you obtain your food ?
(circle the appropriate responses)

grow all, grow part, gather, hunt, purchase, borrow, exchange
government relief, church relief, etc., through gifts, begging/alms
others: _____

b) How did you obtain your food where you moved from ?

grow all, grow part, gather, hunt, purchase, borrow, exchange
government relief, church relief, etc., through gifts, begging/alms
others: _____

(65a) How would you rate the food situation of the family over time ?
(place ticks to indicate the responses)

Period	Plenty	More than enough	Enough	Not enough	Famine
Past year					
Since census					
Since 1985					
Year prior to migration					
Five years before move					
Since villagization					
Since Uhuru					
Since birth					

b) What do you expect the food situation for your family to be in the next year given the present trends in rainfall ? (circle the appropriate response)

(i) plenty (ii) more than enough (iii) enough

(iv) not enough (v) hunger/famine (vi) can't predict

(66a) In which months are the following food situations ?

Surplus: _____ More than enough: _____ Just enough: _____

Shortage: _____ Hunger/famine: _____

b) If there is a food shortage or famine, where will you obtain it and from whom ?

Where from: _____

Who from: _____

(67) Please tell us which crops do/did you grow as a food reserve ? (note all crops)

(i) In this village: _____

(ii) In the village you moved from: _____

(iii) Why did you choose to grow these crops as a food reserve ?

(68) What are the reasons (fundamental) that have precluded you from obtaining enough food for your family in this village and in the place you moved from ?

(i) In this village: _____

(ii) In the village you moved from: _____

(69a) Please tell us how your family obtains its income ?
(circle the appropriate responses)

(i) Sale of: crops, livestock, livestock products

from hunting, gathered produce, liquor, wood

charcoal, bricks, honey, (other)

(ii) Employment: small jobs, seasonal, long term

(iii) Other: sent money, resources, business, gifts, alms, pension

b) How did your family obtain its income where you moved from ? (note all sources)

(70a) Please tell us if you can obtain an income that is adequate for your family needs ? (circle the appropriate response)

(i) more than needed (ii) is enough for needs (iii) is less than needed

(iv) no response

b) How would you compare your present income with where you used to live ?

(i) much larger (ii) larger (iii) about the same

(iv) smaller (v) much smaller (vi) no answer

(71) Did you move from the place where you were living because of inadequate food and/or income ?

(i) inadequate food (ii) inadequate income

(iii) other reasons (note): _____

(72a) What work/activity would you think of undertaking to increase food and income ?

(i) to increase food: _____

(ii) to increase income: _____

b) At what level should an increase in food security be sought ?

family, relatives, friends, village, district, region, nation

c) At what level should aid/assistance to improve food security be provided ?

individual, family, relatives, friends, village,

district, region, nation, (others): _____

d) At what level should an increased income be sought ?

individual, family, relatives, friends, village, co-op

district, region, nation

e) At what level should aid/assistance to increase income be provided ?

individual, family, relatives, friends, village, co-op

district, region, nation, other: _____

(73) Please tell us if you would move from this village for the following reasons ?

(place ticks to indicate the appropriate responses)

REASON	No	Yes	Maybe	Don't Know
lack of food				
lack of income				
lack of land to farm				
lack of pasture				
lack of water				

lack of firewood/wood				
lack of security				
to increase food				
to increase income				
to increase land				
to increase pasture				
to increase water				
to increase firewood/wood				
to increase security				
to increase harvest				

because of other reasons: _____

(M) LIFE, FAMILY RESOURCES AND MIGRATION

(74a) Please tell us the characteristics of your home :

Walls are made of: _____ Roof: _____

No. of rooms: _____ Room for children ? _____

Have: stove, toilet, cropbins, livestock shed

b) What were the characteristics of the home where you moved from ?

Walls were made of: _____ Roof: _____

No. of rooms: _____ Was there a children's room ? _____

Was there: stove, toilet, cropbins, livestock shed

(75) How would you compare the quality of your present home with where you moved from ? (circle the appropriate response)

(i) very much better (ii) much better (iii) the same

(iv) much worse (v) very much worse (vi) can't tell

(76) What kinds of things for family use do you have here and had in the place you moved from ? (place ticks to indicate responses)

Things/Utensils	Present home	Previous place
Table		
Chairs		
Benches		
Stools		
Saucepans/pots		
Plates/bowls		
Knives/spoons		
Bucket/trays		
Mattresses/beds		
Lamp/karabai		
Plough		
Axe		
Bicycle		
Cart		
Radio		

(77) What do/did you use for cooking and lighting in your home ?

(i) Present home: to cook _____ for lighting _____

(ii) Previous home: to cook _____ for lighting _____

(78a) Please tell us where do you get the following needs ?

NEEDS	FROM	DISTANCE	COSTS
Water			
Firewood			
Grass for thatch			
Farm tools			
Clothes			
Medicines			

b) Where did you get the following needs in the village that you moved from ?

NEEDS	FROM	DISTANCE	COSTS
Water			
Firewood			
Grass for thatch			
Farm tools			
Clothes			
Medicines			

(79a) Please tell us what kinds of farm tools you have and used to own for your use ?

(i) Present home: _____

(ii) Previous home: _____

b) Do/did you borrow or rent any farm tools for your use ?

(i) Present residence: borrow _____ from _____
rent _____ from _____ costs _____

(ii) Previous residence: borrowed _____ from _____
rented _____ from _____ costs _____

(N) HUMAN-WILDLIFE INTERACTIONS AND MIGRATION

(80a) Please tell us what kinds of wildlife do you usually see in this village or area ?

(i) Kinds of wildlife: _____

(ii) Seen: within village, surrounding village, nearby village,
forest reserve, wildlife park

(iii) When: all year; short rains; between short-long rains; long rains; dry season

(iv) Number of sightings: very many; many; few; very few; none

b) What kinds of wildlife did you see in the village or area that you moved from ?

(i) Kinds of wildlife: _____

(ii) Seen: within village, surrounding village, nearby village,
forest reserve, wildlife park

(iii) When: all year; short rains; between short-long rains; long rains; dry season

(iv) Number of sightings: very many; many; few; very few; none

(81) Please tell us the trends in the number of wildlife seen in these places:
(circle the appropriate response)

(i) great increase (ii) increase (iii) no change (iv) some decrease

(v) great decrease

(82) Have you had your crops or livestock damaged/destroyed by wildlife ?

a) In this village

frequency : many times, sometimes, few times, none

type of crops/livestock: _____

by which wildlife: _____

b) In the village you moved from

frequency : many times, sometimes, few times, none

type of crops/livestock: _____

by which wildlife: _____

(83) Please tell us if you have moved your home or shambas because of losses/damage due to wildlife ? (circle the appropriate response)

a) In this village: (i) moved home (ii) moved shamba

(iii) incurred loss but was unable to move

b) In the village that you moved from:

(i) moved home (ii) moved shamba

(iii) incurred loss but was unable to move

c) Do you scare (birds) or drive away wildlife from your shambas ?

(i) Now: no yes (ii) Previously: no yes

(84) Please tell us what you think about the wildlife reserves that are near your village area ?

a) to you/family : is a gain; is neither a gain nor a loss;

is a loss; Don't know

b) to villagers: is a gain; is neither a gain nor a loss;

is a loss; Don't know

c) to nation: is a gain; is neither a gain nor a loss;

is a loss; Don't know

d) How would you compare the land in this village with the land within the national park ?

(85) Please tell us if you would like or desire to use the wildlife reserves for the following purposes ? (place a tick if the response is 'yes')

PURPOSES	SERENGETI	GRUMETI	MASWA
Cultivate			
Graze livestock			
Gather foods			
Raise bees			
Cut wood			
Hunt wildlife			
Tour			

(O) POPULATION CHANGE, RESOURCES AND DEVELOPMENT

(86a) How would you describe the trends in population size in this village and in the village that you were living in ? (circle the appropriate response)

(i) In this village: rapid increase; slow increase; no change;

slow decrease; rapid decrease; don't know

(ii) In the village you moved from: rapid increase; slow increase; no change;

slow decrease; rapid decrease; can't remember

b) Please tell us about the trends in the number of in-migrants/out-migrants in this village and in the village that you moved from ? (note the years of the specific trend if possible)

(i) This village: rapid in-migration; slow in-migration;

no in-migration/out-migration; slow out-migration;

rapid out-migration; don't know

(ii) Village you moved from: rapid in-migration; slow in-migration;

no in-migration/out-migration; slow out-migration;

rapid out-migration; can't remember

c) What do you think will be the trend in the population size of the village in the years ahead ?

rapid increase; slow increase; no change;

slow decrease; rapid decrease; difficult to predict

(87) How would you rate the availability of following resources and services for the population size of this village, the village that you moved from, and the neighbouring village ? (place ticks to indicate the appropriate response)

a) This Village

Needs	Plenty	Enough	Inadequate	Shortage
Land				
Pasture				
Water				
Wood				
School				
Clinic				
Food				
Roads				

b) Village you Moved From

Needs	Plenty	Enough	Inadequate	Shortage
Land				
Pasture				
Water				
Wood				
School				
Clinic				
Food				
Roads				

c) Neighbouring Village

Needs	Plenty	Enough	Inadequate	Shortage
Land				
Pasture				
Water				
Wood				
School				
Clinic				
Food				
Roads				

(88) How would you rate the overall population of people and livestock in the following locations ? (use the codes to note the appropriate response)

CODES: 1=too many 2=many 3=enough 4=few 5=very few 6=don't know

PLACE/AREA	Number of People	Number of Stock
Village Moved From		
This Village		
Neighbouring Village		
In Ward		
In District		
In Region		

(89) How would you rate the availability of resources and social services considering an increase or reduction in the human population in this village, neighbouring villages, and in the ward and district ? (use the codes to note the appropriate response)

a) This Village

Number of people	Land	Pasture	Water	Wood	Social services
Rapid Increase					
No change					
Rapid Decrease					

CODES: 4=more than enough 3=enough 2=inadequate
1=great shortage 0=Don't know/Unable to rate

b) Neighbouring Villages

Number of people	Land	Pasture	Water	Wood	Social services
Rapid Increase					
No change					
Rapid Decrease					

c) Ward or District (state the specific area)

Number of people	Land	Pasture	Water	Wood	Social services
Rapid Increase					
No change					
Rapid Decrease					

(90) Please tell us what you think are the most important of your needs ?
(circle the appropriate response)

(i) land to cultivate (ii) more land to cultivate (iii) more fertile area

(iv) more pasture land (v) area with better pasture

(vi) area with more wood/firewood (vii) availability of good water

(viii) availability of social services (note services)

(ix) greater security (x) control of wildlife damage

(xi) availability of farm inputs and tools

(xii) Others: _____

(91) How would you rate the trend in development in this village during the following periods ? (place ticks to indicate the response)

Trend	Rapid	Slow	No change	Decline
Since 1988				
Since 1985				
Since 1980				
Since 1974				
Since 1961				

(92a) What do you think is the level of development in this village as compared to the village that you moved from ? (circle the appropriate response)

(i) very much higher (ii) much higher (iii) no difference

(iv) much lower (v) very much lower (vi) don't know

b) How do the villages differ in their development ? Please explain.

(93) How would you compare yourself with the majority of villagers on the following aspects ? (place ticks to indicate the appropriate responses)

a) In this Village

Your state	Land size	Land fertility	L'stock owned	Food	Life	Income
Very much better						
Much better						
Same						
Much worse						
Very much worse						
Don't know						

b) Village you Moved From

Your state	Land size	Land fertility	L'stock owned	Food	Life	Income
Very much better						
Much better						
Same						
Much worse						
Very much worse						
Don't know						

c) Neighbouring Villages

Your state	Land size	Land fertility	L'stock owned	Food	Life	Income
Very much better						
Much better						
Same						
Much worse						
Very much worse						
Don't know						

(Interviewer, remember to thank the respondent for his/her and family's co-operation, time and hospitality. If you did not complete the interview, please arrange the day, time and place to interview again. Note the arrangement on the first page).